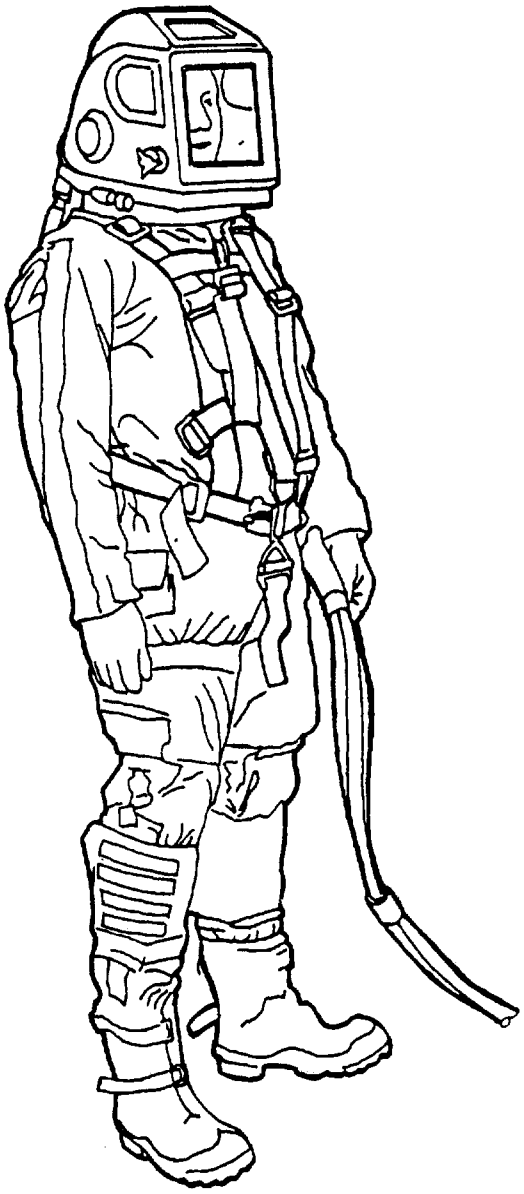
TECHNICAL MANUAL
OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL
SUPPORT MAINTENANCE MANUAL
MK12 SURFACE SUPPORTED DIVING
SYSTEM (SSDS)
(NSN 4220-01-097-5674)



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HEADQUARTERS, DEPARTMENT OF THE ARMY

30 SEPTEMBER 1992

WARNING

If the visual inspection indicates weakening of the hose or couplings, or otherwise renders the hose suspect, the hose shall be retired from service and replaced immediately.

WARNING

Arbitrary omission of steps could result in equipment failure and possible injury.

WARNING

Ensure air is available to the helmet, and the air supply valve is opened slightly before placing the helmet on the diver. Exhaust valve should be fully open.

WARNING

If an underwater emergency occurs, notify dive station and dive partner immediately. Do not ditch the diving helmet. Failure to follow prescribed emergency procedures may result in injuries to personnel.

WARNING

To prevent the valve from jamming under normal conditions, the supply valve should never be fully shut or fully open.

WARNING

Wear face shield and clear immediate area of personnel when using low pressure air.

WARNING

Repair or replace worn or damaged parts immediately with authorized replacement parts. Failure of a component during a dive could result in injury or death to personnel.

WARNING

Do not attempt to disassemble diving system components while a breathing air circuit is pressurized. Failure to observe this warning may result in injury or death to personnel.

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

WARNING

Repair or replace worn or damaged parts immediately with authorized parts. Failure of a component during equipment usage could result in injury or death to the operator.

WARNING

Do not attempt to disassemble diving system components while pressurized. Failure to observe this warning may result in injury or death to personnel.

WARNING

This manual is not intended to dictate safe diving operation or procedures. Diving supervisors are ultimately responsible for conducting safe diving operations in accordance with FM 20-11-1, Military Diving, Volume I and all other applicable military diving safety and operational references.

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

WARNING

If in doubt about the serviceability of a part, repair or replace it immediately. Use only approved replacement parts. Failure of a component part during a dive may result in injury or death to personnel.

WARNING

Remove all traces of lacquer thinner with non-ionic detergent (NID) solution and rinse with fresh water. Residual lacquer thinner will contaminate breathing atmosphere and may cause injury or death to personnel.

WARNING

Do not use trichloroethylene or methyl chloroform in cleaning operations with any diving system. Use of either chemical can result in death when operators are exposed to these contaminates under pressure. The contaminates are not water soluble. If contamination or suspected contamination occurs, immediately discontinue all equipment operations and notify the Army Diving Safety Office at Ft. Eustis, Va., Autovon 927-1329/Commercial 804-878-1329. The only acceptable cleaning agents are tribasic sodium phosphate and non-ionic soaps.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to personnel.

TECHNICAL MANUAL

NO. 5-4220-225-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 SEPTEMBER 1992

Operator, Unit, Direct Support, and General Support Maintenance Manual for MK12 SURFACE SUPPORTED DIVING SYSTEM (SSDS) (NSN 4220-01-097-5674)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MMTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

OVERVIEW

This chapter contains general information pertaining to MK12 Surface Supported Diving System (SSDS), and its components.

SECTION I. GENERAL INFORMATION

1-1. **Scope**. This manual contains information necessary to operate, troubleshoot, repair, and maintain the MK12 Surface Supported Diving System (SSDS) and its associated equipment at the Operator, Unit, Direct Support, and General Support maintenance levels. The MK12 SSDS is depicted in figure 1-1. The MK12 SSDS provides diver support and communications for working divers with air as the breathing medium. This manual does not include instructions in the principles of diving or in the conduct of diving operations. All users of this equipment must be qualified Army divers or trainees under the operational control of a designated diving officer of an authorized diving command or activity.

1-2. **Maintenance Forms, Records and Reports**. Department of the Army forms and procedures used for equipment maintenance will be those prescribed in DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. **Destruction of Army Materiel to Prevent Enemy Use**. To prevent enemy use of the MK12 SSDS, follow the procedures given in TM 750-244-1-2, Destruction of Army Materiel to Prevent Enemy Use.

1-4. **Preparation for Shipment or Storage**. Refer to Chapter 4, Section VI, and SB 742-97-01, for Storage Serviceability Standard for TROSCOM materiel procedures to place the equipment into storage and prepare equipment for shipment.

1-5. **Reporting Equipment Improvement Recommendations (EIRs).** If your MK12 SSDS needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality

Deficiency Report). Mail it to us at: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MOF, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120-1798. We will send you a reply.

1-6. List of Abbreviations.

ac	Alternating current
ACFM	Actual cubic feet per minute of gas flow
CCN	Closed cell neoprene
CO_2	Carbon dioxide
dBA	Noise level standard (scale A)
dc	Direct current
FSW	Feet of seawater
Hg	Mercury
H.P.	High Pressure
Hz	Hertz; unit of electrical frequency (cycles per second)
H_2O	Water (fresh)
I.D.	Inside diameter
Kg	Kilogram
Kn	Knot
lb	Pound
LPM	Liters per minute, flow
Nm	Newton meter
NWDL	Normal working diving limit
O.B.	Overbottom
O_2	Oxygen
P	Pressure differential
psi	Pounds per square inch
psia	Pounds per square inch, absolute
psid	Pounds per square inch, differential
psig	Pounds per square inch, gage
RTV	Room Temperature vulcanizing sealant
SCUBA	Self Contained Underwater Breathing Apparatus
SEV	Surface equivalent volume
SSDS	Surface Supported Diving System
U/W	Underwater
VAC	Vacuum
Vac	Volt, alternating current
Vdc	Volt, direct current
°C	Degrees Celsius
°F	Degrees Fahrenheit

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1-7. **Equipment Characteristics, Capabilities, and Features**. The MK12 SSDS provides the Army with a variety of different diving capabilities using the same helmet. The MK12 SSDS consists of three major assemblies which are, the helmet assembly, the dress assembly, and support equipment. The system is designed to directly interface with existing equipment, which normally includes the diving console and communications station. The MK12 is designed and built with emphasis on the following features:

- Interchangeability of parts
- Minimal maintenance time
- Positive and negative buoyancy control
- Reduced system weight
- High degree of diver safety
- Provision for a swimming capability
- Reduced helmet and ejector noise
- Wide field of view
- Extended life support duration
- Provision for dry or wet diver envelope
- Provision for diver weight distribution and selection
- Reduced possibility of diver blowup
- High degree of diver mobility
- High level of diver comfort

1-8. **Location and Description of Major Components**. (figure 1-2)

HELMET ASSEMBLY (1). Provides the diver with air to breathe from the surface. A microphone and speaker allows the diver to communicate with other divers or with support crew above.

NECK DAM (2). (Used only when drysuit is not used.) Attaches to the bottom of the helmet and creates a watertight seal against the diver and prevents water from entering the helmet.

DRYSUIT (3). Provides protection for the diver when diving in cold water.

OUTER GARMENT (4). Provides protection for the drysuit, and helps prevent over inflation of the drysuit. It has several pockets for storing diver weights.

JOCKING HARNESS (5). Secures the helmet assembly to the diver, provides an attachment point for the umbilical and serves as a further restraint against over inflation-of the drysuit.

UMBILICAL (6). A three line assembly connected between the surface and the diver. It provides communications, air supply, and depth information.

DIVER COMMUNICATION (7). A manually controlled communication station allows the tender to speak to one or all of the divers by operating the panel mounted press-to-talk switches.

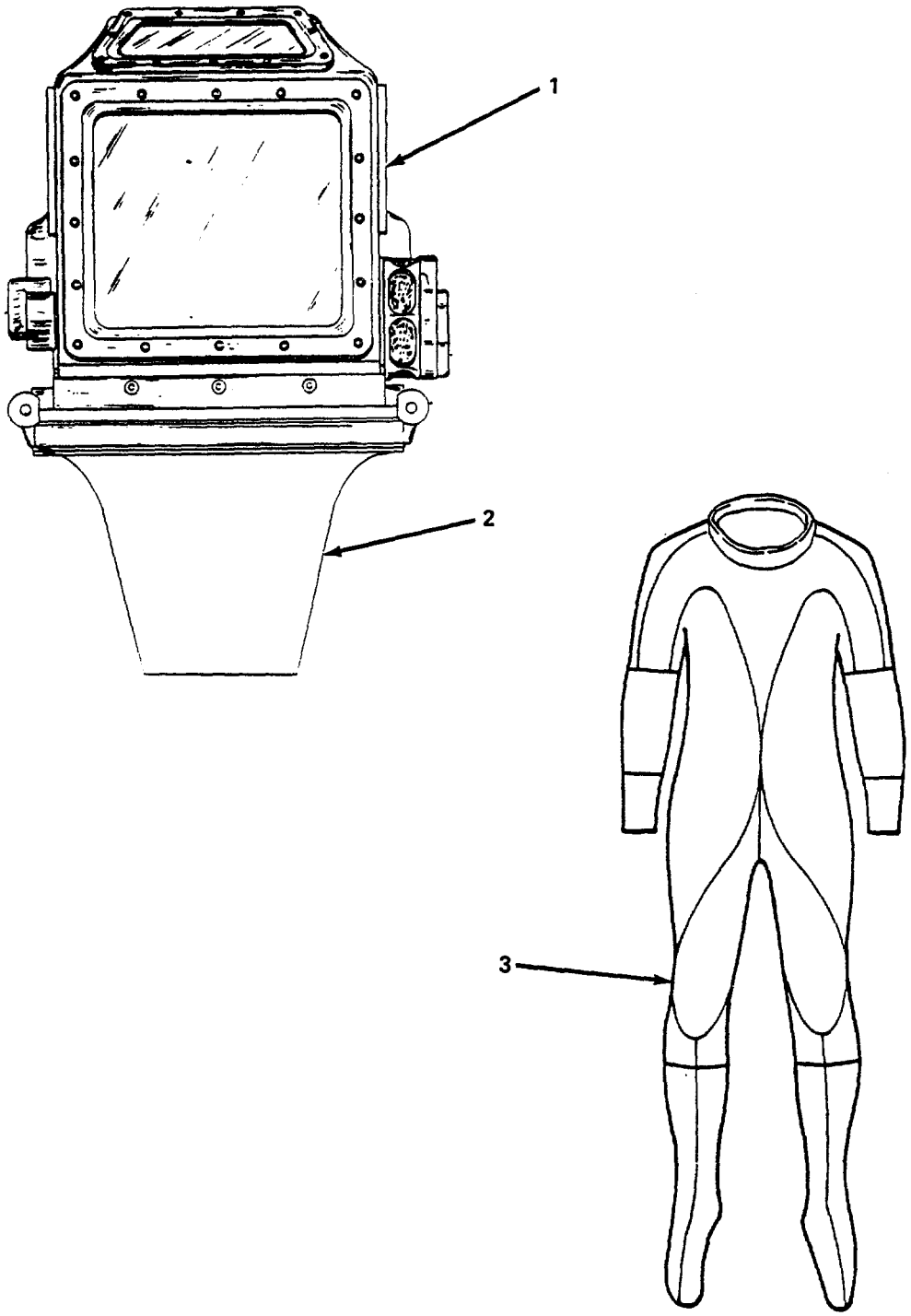


Figure 1-2. Location and Description of Major Components (Sheet 1 of 3).

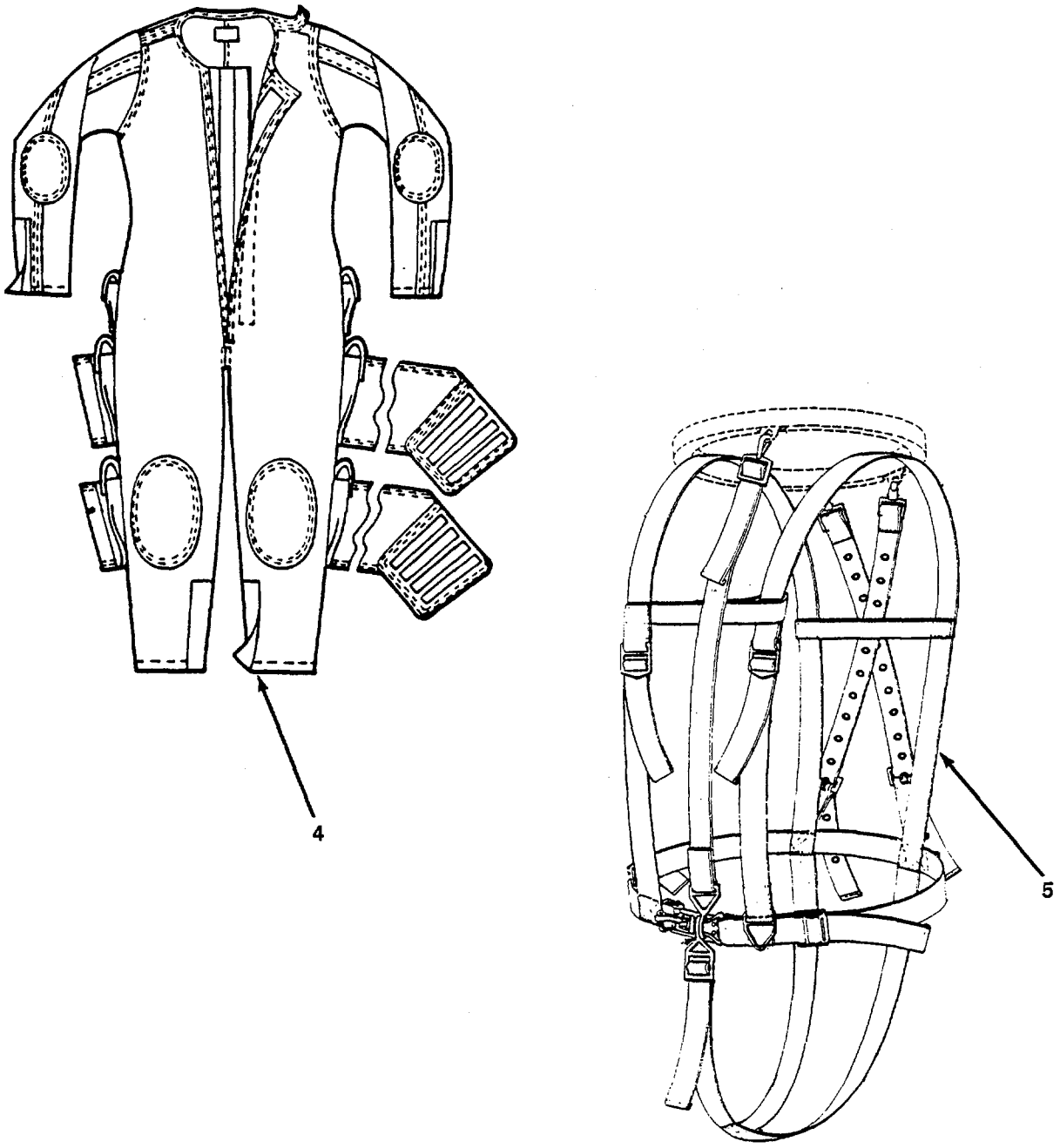


Figure 1-2. Location and Description of Major Components (Sheet 2 of 3).

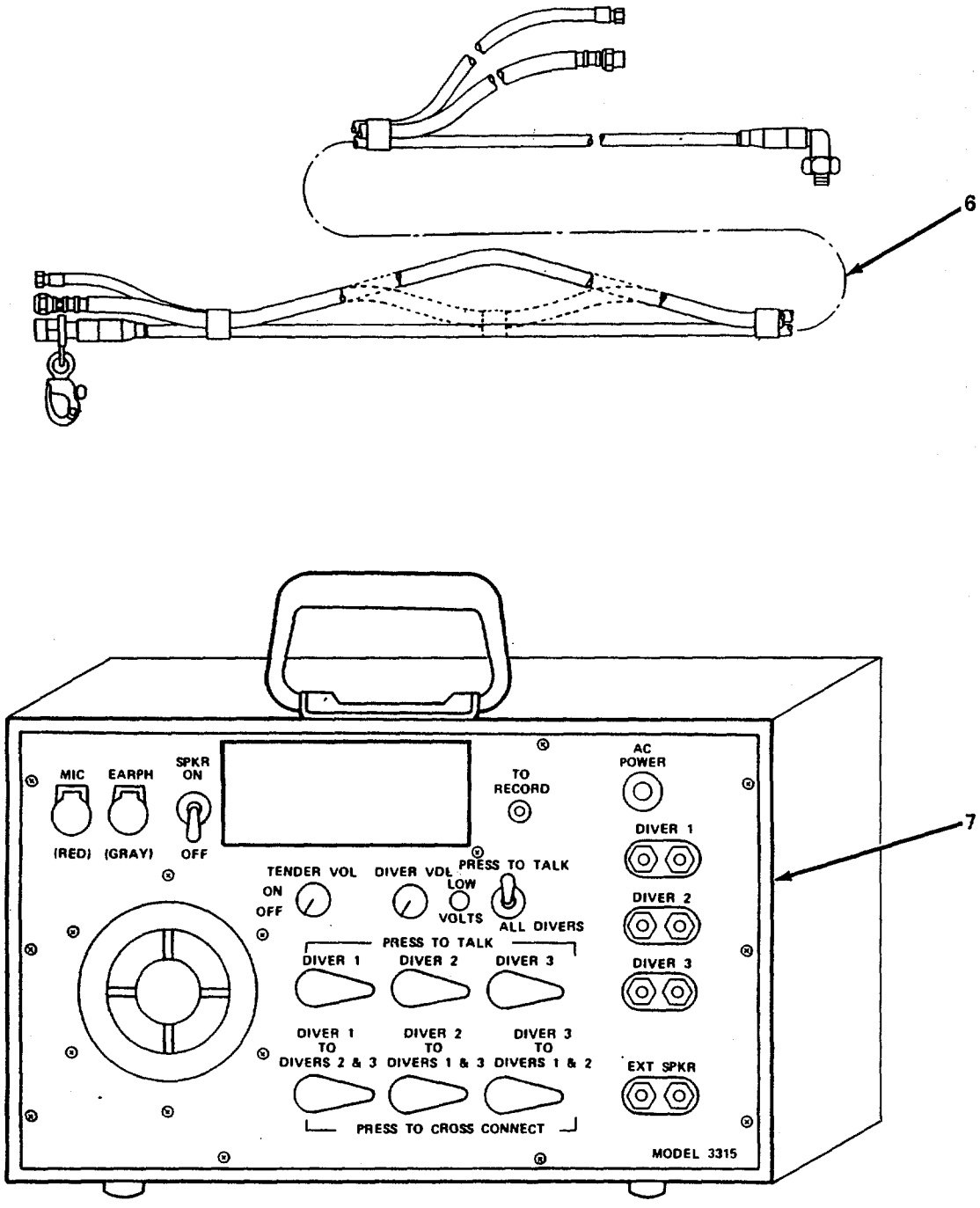


Figure 1-2. Location and Description of Major Components (Sheet 3 of 3).

1-9. **Equipment Data**.

Helmet Assembly	
Weight	40 lb (18 kg)
Flow	6 ACFM
Breathing Medium	Air
Operating Temperature Range (Air)	29-129°F (-2-49°C)
Operating Temperature Maximum (Water)	92°F (33°C)
Normal Working Dive Limit	190 FSW
Exceptional Exposure Dive Limit	285 FSW
Maximum Water Current	2.5 kn
Drysuit	
Weight	8 lb (3.6 kg)
Outer Garment	
Weight	4 lb (1.8 kg)
Jocking Harness	
Weight	3 lb (1.3 kg)
Leg Weights	40 lb (18.2 kg)
Boots (lightweight)	
Weight	10 lb (4.5 kg)
Hip Weights (optional)	20 lb (9 kg)

1-10. **Safety, Care, and Handling**. When operating or performing maintenance on MK12 SSDS observe all WARNING's, CAUTION's and NOTE's in this manual. Avoid careless operating or maintenance habits which cause accidents to personnel and damage to the equipment. The equipment can be extremely hazardous to diving personnel if not operated and maintained properly. If there is the slightest hint of a problem with the equipment, or the equipment may be contaminated do not operate the equipment. Notify your supervisor.

SECTION III. TECHNICAL PRINCIPLES OF OPERATION

1-11. **Theory of Operation**. The MK12 SSDS consists of helmet and dress assemblies with support equipment. The MK12 helmet is operated using air as the breathing medium. The basic helmet assembly is used in all configurations mating with the lower breech ring affixed to either the neckpiece of the drysuit or to a neckdam. Two exhaust valve configurations, using the same body, are available; the adjustable and the ambient. The adjustable valve permits varying the helmet differential pressure (P). The ambient valve has an inherent fixed P. The helmet is secured to the lower breech ring by locking devices w/safety pins. This arrangement provides quick positive alignment of the helmet to the lower breech ring and eases removal. Diver's dress can be tailored to task requirements. A drysuit and outer garment may be used in severe cold working conditions. For diving in warm water a neckdam may be used with or without a wetsuit. The jocking harness is the same for all configurations. The umbilical consists of the diver's high pressure hose, communication/strength cable, and pneumofathometer hose joined together into a single component. Two-way communication between diver and tender or diver to diver is provided, using the communication station.

a. *System Flow. Open Circuit* (figure 1-3). Diver air is delivered through the umbilical. The air hose is terminated at the left side of the diver's waist and is connected to the air supply whip which leads under the left arm to the air adapter at the right rear corner on the helmet. In the air supply adapter, the air passes through a filter screen and a cartridge-type one way valve which prevents depressurization of the helmet through the hose should supply pressure be lost. From the adapter, the air flows through the tubing assembly to the air supply valve mounted in the right side of the helmet. The air supply valve varies the flow linearly through its range and has a control knob indexed by an extended vane to indicate position. From the supply valve, the air flows to the supply diffuser located across the lower edge of the front viewport. The diffuser serves the dual function of evenly discharging the air to the helmet and helping to suppress air noise. Should the diffuser become clogged or frozen, a relief valve mounted in the elbow of the diffuser adapter will open at a nominal 20 psi to prevent rupturing the diffuser. The helmet air flow is discharged and diffused through the exhaust valve in the lower left side of the helmet. The exhaust valve can be assembled in two configurations. In the adjustable configuration, the diver can vary the helmet P from 0.3 psig to 2.0 psig overbottom pressure. Operating the exhaust valve together with the supply valve allows the diver to control his buoyancy while maintaining adequate ventilation. A chin button is provided which permits the diver to open or shut the adjustable exhaust valve, manually overriding the valve setting. The ambient exhaust valve configuration is installed when the helmet is used with a neckdam. In the ambient configuration, the P across the exhaust valve is fixed at 0.125 psi, which is low enough to prevent neck squeeze at the neckdam.

b. *Helmet Assembly* (figure 1-4). The helmet assembly consists of the shell and base together with the components and parts affixed, including the lower breech ring assembly.

(1) The shell is laid up with fiberglass cloth and polyester resin for a strong, light, impact-resistant structure. The shell is coated with a highly visible yellow gel coat to provide the best underwater definition. A cast lead weight is cut to fit into the crown of the helmet, then laminated with fiberglass and resin. The weight is sized and located as to make the helmet neutral in buoyancy and to counterbalance the weight of the base and breech rings.

(2) There are two breech rings in the helmet mating assembly; the helmet breech ring and the lower breech ring. The helmet breech ring is secured to the base with machine screws, with an preformed packing forming the seal between the base and helmet breech ring. The lower breech ring assembly consists of the lower breech ring, the neckdam or drysuit neckpiece, the retainer, two locking device lugs, and three jocking harness brackets. The neckdam is sealed by compression with a neoprene material and has a highly corrosion-resistant finish. The helmet assembly is secured to the lower breech ring assembly by two locking device assemblies, one on each side. Each locking device consists of a helmet lug mounted on the helmet base which mates with a lug mounted on the lower breech ring. A locking device w/safety pin, locks the two lugs together and secures the helmet.

(3) There are four viewport assemblies in the helmet which provide visibility comparable to that of Self Contained Underwater Breathing Apparatus (SCUBA). A groove is molded into each viewport recess to receive a shaped-to-fit preformed packing. A retainer is placed over each lexan viewport and secured into place with socket head cap screws that mate with female threaded inserts fitted into the helmet shell.

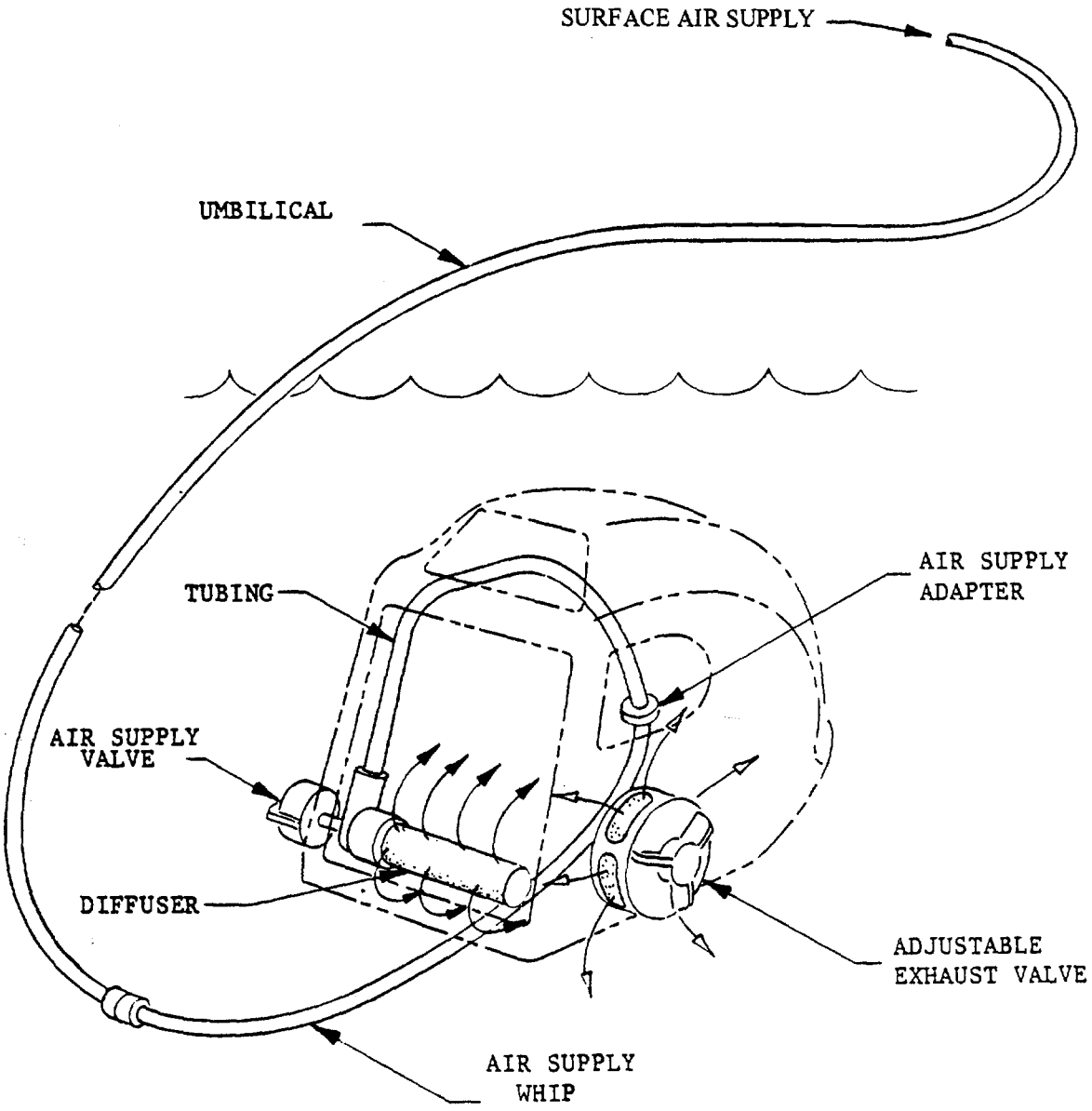


Figure 1-3. MK12 SSDS Open Circuit Flow Pattern.

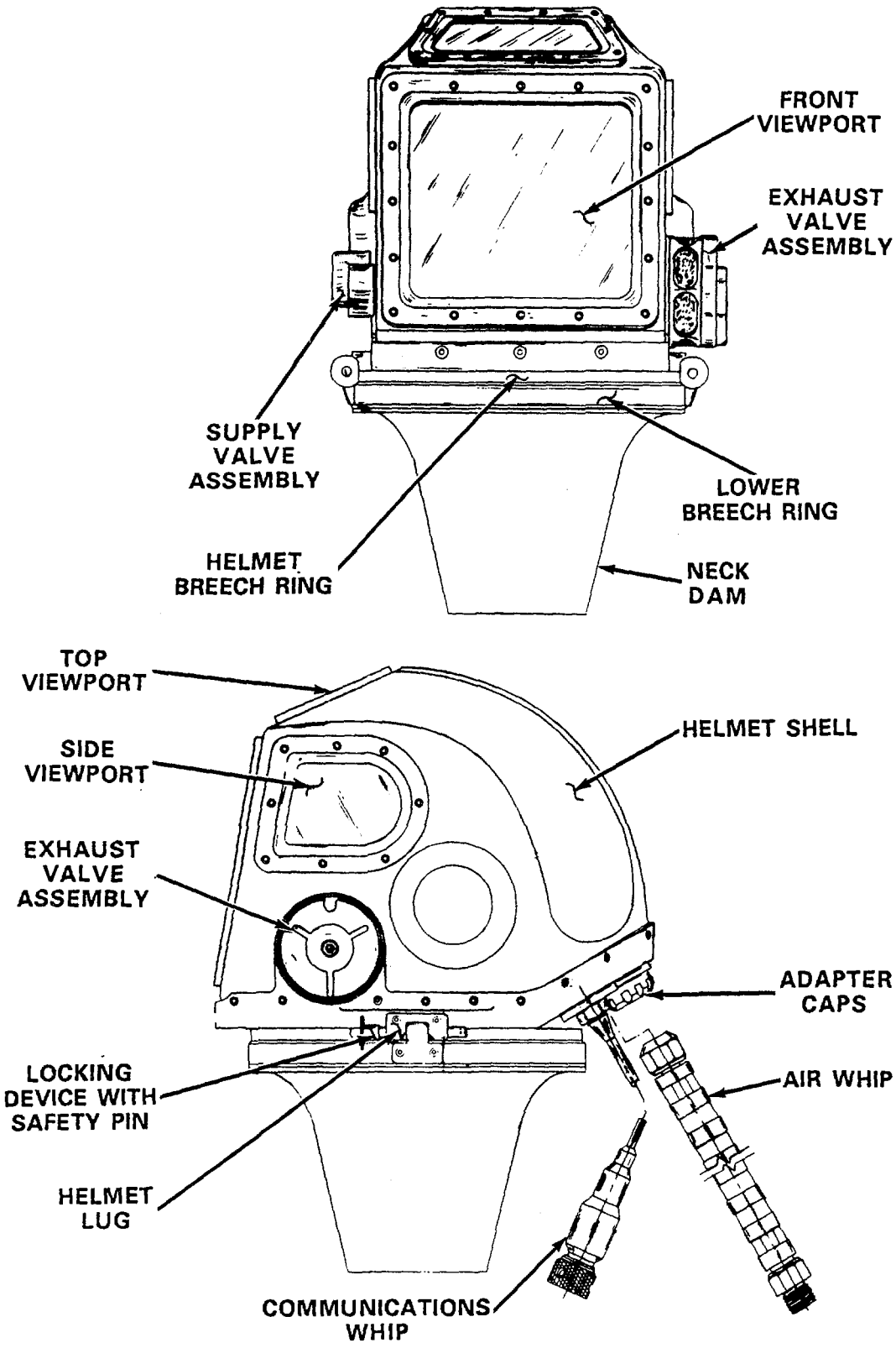


Figure 1-4. MK12 Helmet Assembly.

(4) The air supply assembly handles the air flow through the helmet from the umbilical to the air supply diffuser. The air supply adapter is secured to the helmet base with three socket head cap screws, and sealed by a barrel preformed packing set into the adapter body. Contained in the adapter is a 100-mesh stainless steel filter screen, upstream of a cartridge-type one way valve. A preformed packing in the body of the one way valve seals the bore of the adapter. The 3/8-inch stainless steel air tubing is connected to the air supply adapter by a double male fitting which threads into the air supply adapter and sealed with a preformed packing. The opposite end of the tubing is terminated in the same fashion with the double male fitting threaded into the air supply valve body assembly. The elbow of the valve has a threaded relief valve boss to accept the air supply relief valve, which opens at a nominal 20 psig to protect the air supply diffuser against possible rupture should the filter clog or freeze up. The supply diffuser threads into the elbow and serves the dual purpose of diffusing the air into the breathing area and suppressing air noise. The supply valve varies the air flow through its full range. The valve handle is secured to the valve stem by self-locking set screws threaded into two of the handle vanes. Valve handle position is indexed by an extended third vane. The helmet air is discharged through the exhaust valve in either the adjustable or the ambient exhaust valve configuration.

(5) The exhaust valve (figure 1-5) is easily disassembled and reassembled for inspection or maintenance without need for special tools. In the adjustable configuration air exhaust is controlled by a spring-laced poppet-type valve. It is adjustable to maintain helmet pressure in the range of 0.3 $\pm$ 0.05 psig to 2.0 $\pm$ 0.3 psig above ambient pressure with 6 ACFM flow. Turning the valve handle increases or decreases the spring tension which produces a corresponding effect on internal helmet P. A spring tension adjustment screw, externally accessible at the valve handle center, is used to obtain the high/low settings of the valve operating pressure range. Since the poppet valve is restricted only by spring tension, the diver can press against the chin button or pull it shut with his mouth to manually override helmet P settings. The valve body is mounted to the helmet through an extension of the helmet base and sealed in the penetration with a preformed packing.

(6) When the helmet is used with a neckdam, the ambient exhaust valve (figure 1-5), configuration must be employed. The ambient exhaust valve maintains a low helmet P of 0.125 psig with a flow of 6 ACFM. In the ambient configuration the helmet P is not variable and the valve consists basically of a diffuser with a rubber diaphragm one-way valve. Mounting is the same as the adjustable exhaust valve.

(7) The MK12 SSDS earphones are mounted in molded rubber cups which are cemented into recesses on either side of the helmet shell. The microphone is mounted in an openback rubber cup held by a stainless steel spring clip which snaps onto the air supply valve body. With the communications station, the earphones are connected in parallel, and are in parallel with the microphone. The earphones will then function as transceivers in the event of a microphone failure.

(8) The interior surfaces of the helmet are lined with 1/2-inch thick open-cell polyurethane foam, attached to the helmet with Velcro tape. The liner serves to absorb and deaden helmet noise and to reduce condensation on the helmet interior.

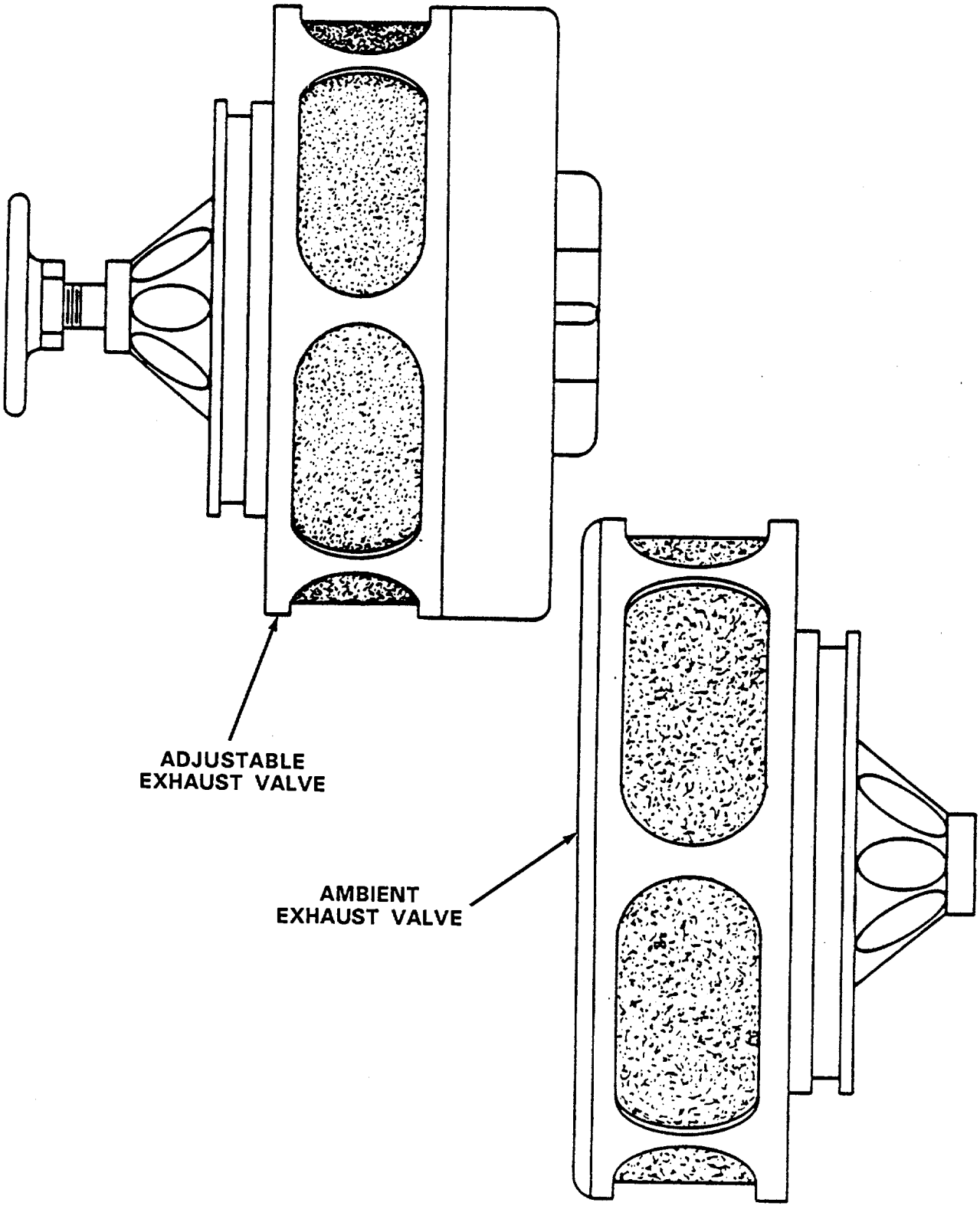


Figure 1-5. Exhaust Valves.

CHAPTER 2

OPERATING INSTRUCTIONS

OVERVIEW

This chapter contains information and procedures required by the operator to operate the MK12 SSDS safely and efficiently.

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. **General**. This section contains information to familiarize the operator and the diver with his equipment.

2-2. **Helmet Assembly** (figure 2-1).

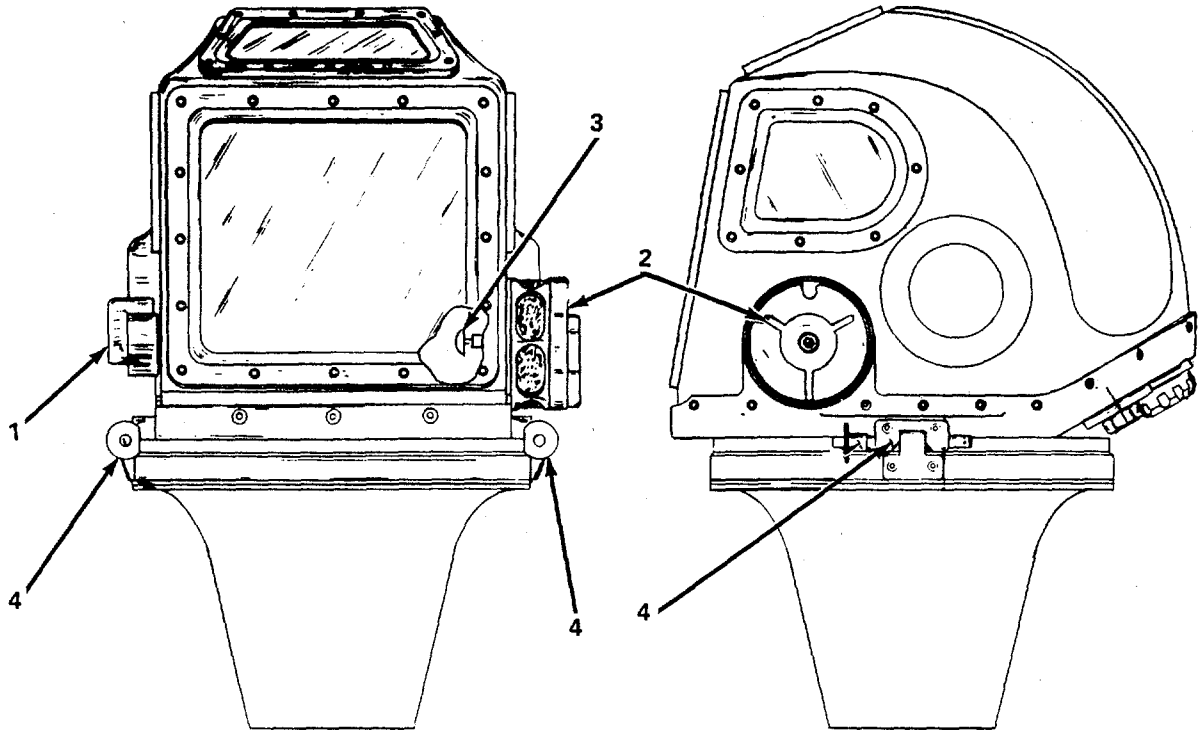


Figure 2-1. MK12 SSDS Helmet Assembly Controls and Indicators.

Key	Control or Indicator	Function or Use
1	Air Supply Valve	Control knob regulates the flow of air into the helmet.
2	Exhaust Valve	a. Adjustable configuration: diver can adjust helmet P from 0.3 psig to 2.0 psig overbottom pressure. Operating together with the air supply valve allows diver to control buoyancy while maintaining adequate ventilation. b. Ambient configuration: installed when helmet is used with neckdam. P is fixed at 0.125 psig to prevent neck squeeze.
3	Chin Button (adjustable configuration)	Permits the diver to manually override the exhaust valve setting.
4	Locking Device Assemblies	Secures helmet to lower breech ring. Operated by locking device with safety pins.

SECTION II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. **General**. Operator PMCS are performed to ensure that the MK12 SSDS is ready for operation at all times. Perform the checks and services at the specified intervals.

a. Before you Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS prior to the equipment leaving its containment area or performing its intended mission.

b. While you Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS when the equipment is being used in its intended mission.

c. After you Operate. Perform your after (A) PMCS after the equipment has been taken out of its mission mode or returned to its containment area.

d. If Equipment Fails to Operate. Perform proper troubleshooting procedures. Report deficiencies on the proper forms as described in DA PAM 738-750, The Army Maintenance Management System.

2-4. **Purpose of PMCS Table**. The purpose of the PMCS table is to provide a systematic method of inspecting and servicing the equipment. In this way, small defects can be detected early before they become a major problem causing the equipment to fail to complete its mission. The PMCS table is arranged with the individual PMCS procedures listed in sequence under assigned intervals. The most logical time (Before, during or after operation) to perform each procedure determines the interval to which it is assigned. Make a habit of doing the checks in the same order each time and anything wrong will be seen quickly. See paragraphs 2-5 for explanation of the columns in table 2-1.

2-5. **Explanation of Columns**. The following is a list of the PMCS table column-headings with a description of the information found in each column.

a. Item No. This column shows the sequence in which the checks and services are to be performed, and is used to identify the equipment area on the Equipment Inspection and Maintenance Worksheet, DA Form 2404.

b. Intervals. This column shows a (•) when each check is to be accomplished.

c. Item to be Inspected/Procedure. This column identifies the general area or specific part where the check or service is to be done, and explains how to do them.

d. Equipment is Not Ready/Available If. This column lists conditions that make the equipment unavailable for use because it is unable to perform its mission, or because it would represent a safety hazard. Do not accept or operate equipment with a condition in the "Equipment is Not Ready If" column.

NOTE

The terms ready/available and mission capable refer to the status Equipment is on hand and is able to perform its combat mission. Refer to DA PAM 738-750.

2-6. **Reporting Deficiencies**. If your equipment does not perform as required, refer to Chapter 4, Section IV for troubleshooting procedures. Report any malfunctions or failures on DA Form 2404, or refer to DA PAM 738-750.

2-7. **Special Instructions**. Preventive maintenance is not limited to performing the checks and services listed in the PMCS table.

a. Keep it Clean. Dirt, grease, oil, and debris get in the way and may cover up a serious problem. Clean as you work and as needed. Use soap and water to clean rubber or plastic material.

b. Bolts. Nuts. and Screws. Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around boltheads. If you find one you think is loose, tighten it, or report it to unit maintenance if you can't tighten it.

c. Electrical Wires and Cable Connectors. Look for bare wires, and loose or broken connectors. Report defects to unit maintenance.

d. Fluid Lines. Look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots and stains around a fitting or connector can mean a leak. If a leak comes from a loose connector, tighten it. If something is broken or worn out, report it to unit maintenance.

Table 2-1. Operator Preventive Maintenance Checks and Services.

NOTE

Within designated intervals, these checks are to be performed in the order listed.

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before D - During A - After Q - Quarterly

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					NOTE Perform quarterly planned maintenance when helmet is stowed for prolonged periods.	
					HELMET ASSEMBLY	
1.	•		•		Exterior. Visually inspect to ensure all components and parts are properly installed and in good condition.	
2.					Shell and Base.	
	•		•		a. Inspect the shell and base for dirt, corrosion, dents, cracks or chips, and sealant deterioration.	
	•		•		b. Visually inspect for loose or missing base-to-shell mounting screws.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
3.					Viewport Assemblies.	
	•		•		a. Inspect the viewports for scratches, chips and cracks. Smaller scratches do not constitute a safety hazard but may obscure vision. inside surface, it can be reversed and continued in use. Switching the left and right viewports will reverse these surfaces.	A scratch 1/32-inch deep and more than 1-inch long If on the requires replacement of viewport. If both surfaces are marred so that vision is obscured, replace the view-port. If the viewport is cracked or chipped any-where, replace it.

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

B - Before D - During A - After Q - Quarterly

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					HELMET ASSEMBLY (Cont)	
	•		•		b. Inspect the viewports for proper assembly and for loose or missing screws:	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
4.					Breech Rings and Locking Devices.	
	•		•		a. Inspect the helmet breech ring, lower breech ring assembly, and locking devices for dirt, corrosion, and loose or missing screws.	
	•		•		b. Inspect the breech rings and locking devices for proper mating. Ensure the locking devices operate freely and lock positively.	
	•		•		c. Inspect preformed packing for cuts, nicks and deterioration. Replace if required. Apply a light film of lubricant.	
	•		•		d. Inspect the installed neckdams and drysuit butyl rubber neckpieces for deterioration and cuts or tears. Repair or replace if required.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
5.					Adapters.	
	•		•		a. Inspect the air adapter, mixed gas adapters, and communication adapter for corrosion, dirt, and loose or missing screws.	
	•		•		b. Inspect adapter cap seal preformed packing and gaskets for cuts, nicks, and deterioration. Replace if required. Lightly lubricate.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

B - Before D - During A - After Q - Quarterly

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					HELMET ASSEMBLY (Cont)	
6.					Interior.	
	•		•		a. Visually inspect the helmet interior for dirt, oil, and grease, especially under the edges of the helmet liner and mixed gas ducting.	
	•		•		b. Ensure all components and parts are properly installed and in good condition.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
7.					Air Supply System.	
	•		•		Inspect the air supply system for corrosion, dirt, oil and loose or missing screws, fittings, and component parts.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
8.					Air Adapter and Tubing Assembly.	
	•		•		a. Inspect the adapter cap, filter screen, and non-return valve and inspect for dirt, corrosion, and cut, nicked, or deteriorated preformed packing. Notify your supervisor if damage is found.	
	•		•		b. Inspect the air adapter and tubing assembly for corrosion, dirt, and damaged threads.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
9.	•		•		Supply Valve Assembly.	
					a. Turn the valve handle through its full range (approximately 3-1/2 turns). Operation should be firm but smooth. When fully shut, the valve handle should be approximately 1/16-inch above the helmet shell.	

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

B - Before D - During A - After Q - Quarterly

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					HELMET ASSEMBLY (Cont)	
	•	•			b. Inspect the supply valve assembly for corrosion and damage. Ensure the valve mounting and packing gland nuts are snug.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
10.					Air Supply Diffuser.	
	•		•		Inspect for dirt, oil, moisture, and corrosion. Replace filter elements (felts) if required.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
11.					Exhaust Valve Assembly.	
	•		•		Inspect for dirt, corrosion, deteriorated rubber parts, and loose or missing screws. Replace parts as necessary.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
12					Helmet Communication System.	
	•		•		a. Inspect the communication whip assembly for corrosion, damage, and deterioration.	
	•		•		b. Inspect the helmet wiring for broken or shorted leads, corroded terminals, and damaged insulation.	
	•		•		c. Inspect the earphones and microphone for physical damage, dirt, corrosion, moisture, punctured moisture barriers, loose connection, and loose mounts or retainers.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
	•		•		d. Perform a communications test (para. 2-8e)	Helmet fails test.

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

B - Before D - During A - After Q - Quarterly

Item No.	Interval B	Interval D	Interval A	Interval Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					HELMET ASSEMBLY (Cont)	
			•		b. Wash the exposed helmet surfaces with clean freshwater. A mild detergent may be used. Rinse thoroughly with clean freshwater if detergent is used. **NOTE** Ensure the areas under the edges of the liner, mixed gas ducting, and other crevices are cleaned.	
			•		c. Clean viewports with clean freshwater only.	
			•		d. Dry the helmet thoroughly with a clean, lint-free cloth.	
			•		e. Wipe down the cleaned exposed helmet surfaces with two ounces of tincture-of-green soap mixed with one gallon of hot (1400F) water.	
			•		f. Rinse off disinfectant with clean freshwater. Dry thoroughly with a clean, lint-free cloth.	
			•		g. Ventilate the helmet thoroughly prior to stowage or use.	
					h. Remove the test plug and reinstall the air supply diffuser and ear clearing pad.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					HELMET ASSEMBLY (Cont)	
14.					Helmet Assembly Testing.	
					NOTE Perform quarterly and prior to use.	
	•				a. Vacuum Test.Perform vacuum test of the one way valve in accordance with procedures given in paragraph 2-8, a.	Helmet fails test.
	•				b. Flow/P Test.Perform helmet flow/P test in accordance with procedures given in paragraph 2-8, b.	Helmet fails test.
	•				c. Leak Test.Perform helmet leak test in accordance with the procedures given in paragraph 2-8, b.	Helmet fails test.
	•				d. Relief Valve Test.Perform relief valve test in accordance with the procedures in paragraph 2-8, c.	Helmet fails test.
	•				e. Communication Check.Perform communication check in accordance with procedure in paragraph 2-10, e.	Helmet fails test.
					DRESS ASSEMBLY **NOTE** Perform quarterly when the dress assembly has been stowed for prolonged periods, and before and after each use.	
15					Drysuit Inspection.	
	•		•		a. Ensure the butyl rubber neckpiece and zipper laminations are secure.	
	•		•		b. Inspect the suit for possible open seams, tears, abrasions, and punctures.	

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					DRESS ASSEMBLY (Cont)	
	•	•			c. Inspect the zipper for foreign matter, teeth alignment, and breaks in the zipper assembly tape.	
	•	•			d. Visually inspect for dirt, grease, moisture, and odor.	
	•	•			e. If necessary, wash the suit with freshwater. Use a mild soap solution if required. Rinse with clean freshwater.Allow the suit to dry thoroughly before stowing.helmet inoperable.	Inspection reveals any of the defects sighted above or any defect that renders the
16.					Leak Test.	
					CAUTION	
					Use only a MK12 helmet whose P setting is known to be correct.	
	•		•		Leak test the drysuit in accordance with procedures given in paragraph 2-8, d.	Drysuit fails test.
17.					Outer Garment Inspection.	
	•		•		a. Inspect the suit for open seams, tears, abrasions, dirt, grease, and odor.	
	•		•		b. Inspect the Velcro closures to ensure they are clean and in good operating condition.	
	•		•		c. Check the weight pocket assemblies; calf, thigh, and hip, for wear.	
18.					Cleaning Procedures.	
			•		Wash thoroughly.Use a mild soap solution if required. Rinse in clean freshwater. Allow to dry thoroughly prior to stowage.	

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					DRESS ASSEMBLY (Cont)	
19.					Jocking Harness Inspection.	
	•	•			a. Inspect the harness for wear, deterioration and corrosion of the hardware. Pay particular attention to rear jocking strap grommets and webbing.	
	•	•			b. Ensure harness strap stitching is in good condition.	
	•	•			c. Ensure the buckle, latch mechanism, and locking device to be operable.Lubricate as required.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
20.					Boot Inspection.	
	•		•		a. Inspect the boots for wear, deterioration, and corrosion of the loops and buckles.	
	•		•		b. Ensure the straps are in good condition.	
21.					Boot Cleaning.	
			•		Wash the boots inside and out with freshwater. Use a mild soap solution, if required. Rinse with clean freshwater.Allow the boots to dry thoroughly prior to stowage.	
22.					Glove Inspection.	
	•		•		a. Inspect the gloves for wear, deterioration, punctures, and stressed seams.	
			•		b. Wash the gloves with freshwater. Use a mild soap solution if required. Rinse with clean freshwater.Allow the gloves to dry thoroughly, inside and outside, before stowing in a cool dry space.	

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					DRESS ASSEMBLY (Cont)	
23.				•	Glove Leak Test. a. Place an air supply, not to exceed 2 psig, just inside the wrist opening and secure the glove around the air supply. b. Submerge the gloves in freshwater and fill slowly with low pressure air until firm. c. Mark any leak areas for repair and notify your supervisor. d. Secure air pressure and properly stow test equipment.	
24.	•		•		Weights Inspect all weights for burrs, nicks and deformed areas. Smooth all rough areas.	
					UMBILICAL HOSE/AIR SUPPLY WHIP ASSEMBLIES **NOTE** Annual inspections, checks, and tests of the diver's high pressure hose and air supply whip assemblies are scheduled after 3 years of service life (3 years from date of manufacture). However, they may be performed at any time the assemblies become suspect.	

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					UMBILICAL HOSE/AIR SUPPLY WHIP ASSEMBLIES (Cont)	
25.					Whip Assembly	
					NOTE Accomplish annually from three years through burst test failure.	
	•		•		a. Visually inspect the assemblies for loose, damaged and corroded hose clamps. Tighten affected hose clamps as required. Notify your supervisor if damage is found.	
					WARNING If the visual inspection indicates weakening of the hose or couplings, or otherwise renders the hose suspect, the hose shall be retired from service.	
	•		•		b. Visually inspect the hose assemblies for loose or slipped couplings, deterioration of the outer hose covering, abrasion or chafing damage, soft spots or bulges, cuts and tears.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.
26.					Air Hose Assembly	
	•		•		a. Visually inspect the assemblies for loose, damaged and corroded hose clamps. affected hose clamps as required. supervisor if damage is found.	Tighten Notify your
					WARNING If the visual inspection indicates weakening of the hose or couplings, or otherwise renders the hose suspect, the hose shall be retired from service.	
	•		•		b. Visually inspect the hose assemblies for loose or slipped couplings, deterioration of the outer hose covering, abrasion or chafing damage, soft spots or bulges, cuts and tears.	Inspection reveals any of the defects sighted aboveor any defect that renders the helmet inoperable.

Table 2-1. Operator Preventive Maintenance Checks and Services (Cont).

Item No.	Interval B	D	A	Q	Item to be Inspected. Procedure	Equipment Will Be Reported Not Ready If
					UMBILICAL HOSE/AIR SUPPLY WHIP ASSEMBLIES (Cont)	
27.					Communications/Strength Cable.	
	•		•		Inspect for damaged fittings, corrosion, verdigris, and the condition of the outer cover, especially for blisters. Notify you supervisor if damage is found. helmet inoperable.	Inspection reveals any of the defects sighted above or any defect that renders the
28.					Pneumofathometer Hose.	
	•		•		a. Inspect the hose assembly for wear and deterioration.	
	•		•		b. Inspect coupling for deterioration, damage, corrosion, and verdigris.	
					NOTE Perform annually or as often as required.	
	•		•		c. Inspect for blisters, cuts, and abrasions.	Inspection reveals any of the defects sighted above or any defect that renders the helmet inoperable.

2-8. **Test Procedures**. These procedures require the use of the MK12 SSDS Test Set. Only diver's compressed air will be utilized with the test set. A schematic diagram of the test set with a valve lineup matrix is shown in figure 2-3. Procedures should be performed in the step-by-step sequence listed to avoid errors and prevent damage. Each test is written as an independent function for the purpose of testing, following PMCS procedures. During predive testing, transition from one test to another may be simplified by skipping those steps marked with an asterisk (*). All tests are to be performed daily during predive procedures with the exception of the relief valve test, and the drysuit leak test. These are permission functions but will be accomplished as often as the diver supervisor deems necessary. For example, as new suits are brought to the dive station or after repairs have been effected due to damage incurred during previous dives.

a. Vacuum Test of the One Way Valve (figure 2-2).

(1) Remove protective cap and gasket from helmet air supply adapter.

(2) Connect air whip (1) to helmet air supply adapter (2) and other end to adapter (3).

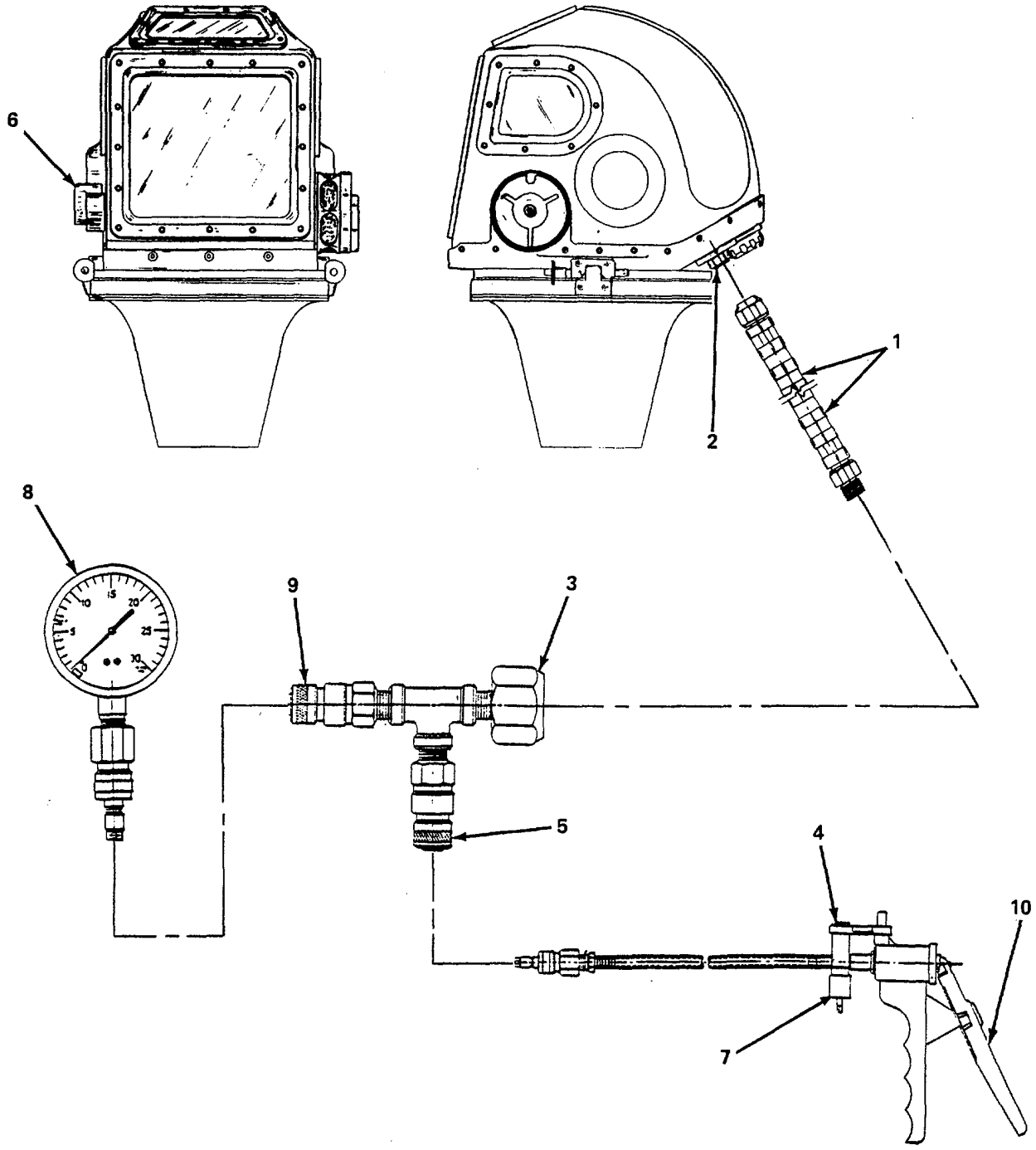


Figure 2-2. Vacuum Test, One Way Valve.

(3) Connect the vacuum pump (4) to the PUMP quick-disconnect fitting (5) on the test set.

(4) Open helmet air supply valve (6) at least one full turn.

(5) Turn VAC/AIR trigger (7) to VAC (straight up and down).

(6) Connect vacuum gage (8) to quick disconnect fitting (9).

(7) Operate the vacuum pump handle (10) until a 20-in. Hg vacuum is indicated on the vacuum gage (8).

(8) Disconnect the vacuum pump (4) from the test set. This step eliminates the possibility of a leak through a faulty vacuum pump.

(9) Observe vacuum gage (8); the gage should show nochange in a 1-minute duration test.

NOTE

If a noticeable change occurs (3 inches Hg), notify you supervisor.

(10) Reconnect vacuum pump (4). Bleed off until the vacuum gage (8) indicates zero.

(11) Turn the VAC/AIR trigger (7) to AIR.

(12) Disconnect and stow the vacuum pump (4).

(13) Remove vacuum gage (8) and stow.

*(14) Remove the air whip (1) from the helmet air adapter (2) and the test set adapter (3).

*(15) Reinstall the protective cap on the helmet air supply adapter (2) and the plugon the test set outlet (OUT) (1) adapter.

*(16) Secure all equipment and stow as required.

b. Helmet P/Flow and Leak Test (figure 2-3).

*(1) Install blanking plate (1).

*(2) Remove the protective cap and gasket from the helmet air adapter and connect air supply whip (2).

(3) Connect air whip to air supply of 100 psi.

(4) Connect pressure gage (3) to quick disconnect on blanking plate (1).

(5) Open exhaust valve (4).

(6) Slowly open air supply valve (5) and check that the pressure gage (3)indicates the applied pressure.

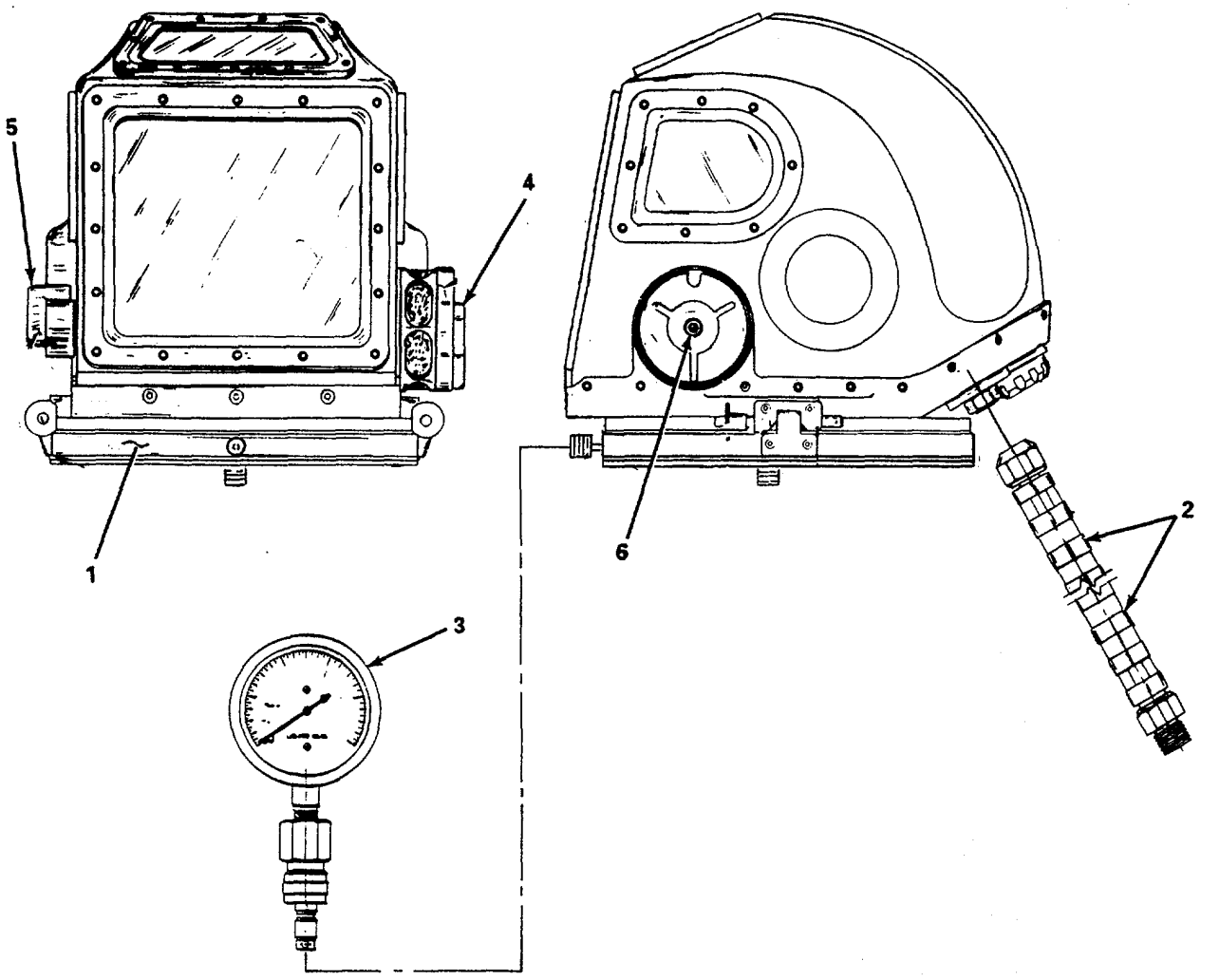


Figure 2-3. Helmet P/Flow and Leak Test.

CAUTION

Never exceed 5 psi pressure differential (P) per minute.

(7) Open the helmet air supply valve (5) approximately one-fourth turn to establish a flow of 6 ACFM.

(8) If helmet P is excessive before 6 ACFM is established, decrease the exhaust valve (4)and continue to increase flow.

(9) With exhaust valve fully open and air supply valve set at1/4 turn open, adjust pressure adjusting screw (6) on exhaust valve to obtain 0.3 ± .05 psig.

(10) Shut the helmet exhaust valve (4) and check the helmet P for a reading of 2.0 + 0.3 psig.

NOTE

Alternately open and shut the exhaust valve to ensure P readings are stable. It should not be necessary to adjust helmet supply valve.

(11) Leak test the helmet assembly.

(a) Fully shut the helmet exhaust valve (4).

(b) Check the entire helmet for leaks with liquid leak detector or soapy water.

NOTE

If a leak is detected, notify your supervisor.

(c) Wash the helmet with freshwater.

(12) Open the helmet exhaust valve (4).

(13) Shut air supply valve (5).

(14) Remove air supply source and disconnect from air supply whip (2).

(15) Remove gage (3) from blanking plate quick disconnect (4).

(16) Remove the blanking plate (1).

(17) Disconnect air supply whip (2).

(18) Install protective cap and gasket on air supply adapter.

c. Relief Valve Test (figure 2-4).

CAUTION

Ensure test set regulator (1)is turned fully counterclockwise before any tests are performed.

NOTE

The relief valve test is intended as a premission tests, unless the relief valve is suspect.

*(1) Remove the helmet air supply adapter cap and gasket and install the air supply whip (1).

*(2) Connect air supply, with pressure gage, to air supply whip (1).

(3) Remove the air supply diffuser assembly (2) and install the test plug in the diffuser adapter (3).

(4) Open air supply valve (4).

(5) Slowly apply supply air and check pressure gage ready when relief valve (5) cracks (opens).

NOTE

The relief valve is set to 15 psig.

(6) If cracking pressure is improper, notify your supervisor.

(7) Slowly remove air supply air.

(8) Watch and listen for the relief valve (5) to seat, approximately 90 percent of cracking pressure (18 psig).

(9) Remove air supply air completely.

(10) Remove air supply from air supply whip (1).

(11) Install protective cover and gasket.

(12) Remove the diffuser test plug and reinstall the air supply diffuser assembly (2).

(13) Stow all equipment and tools.

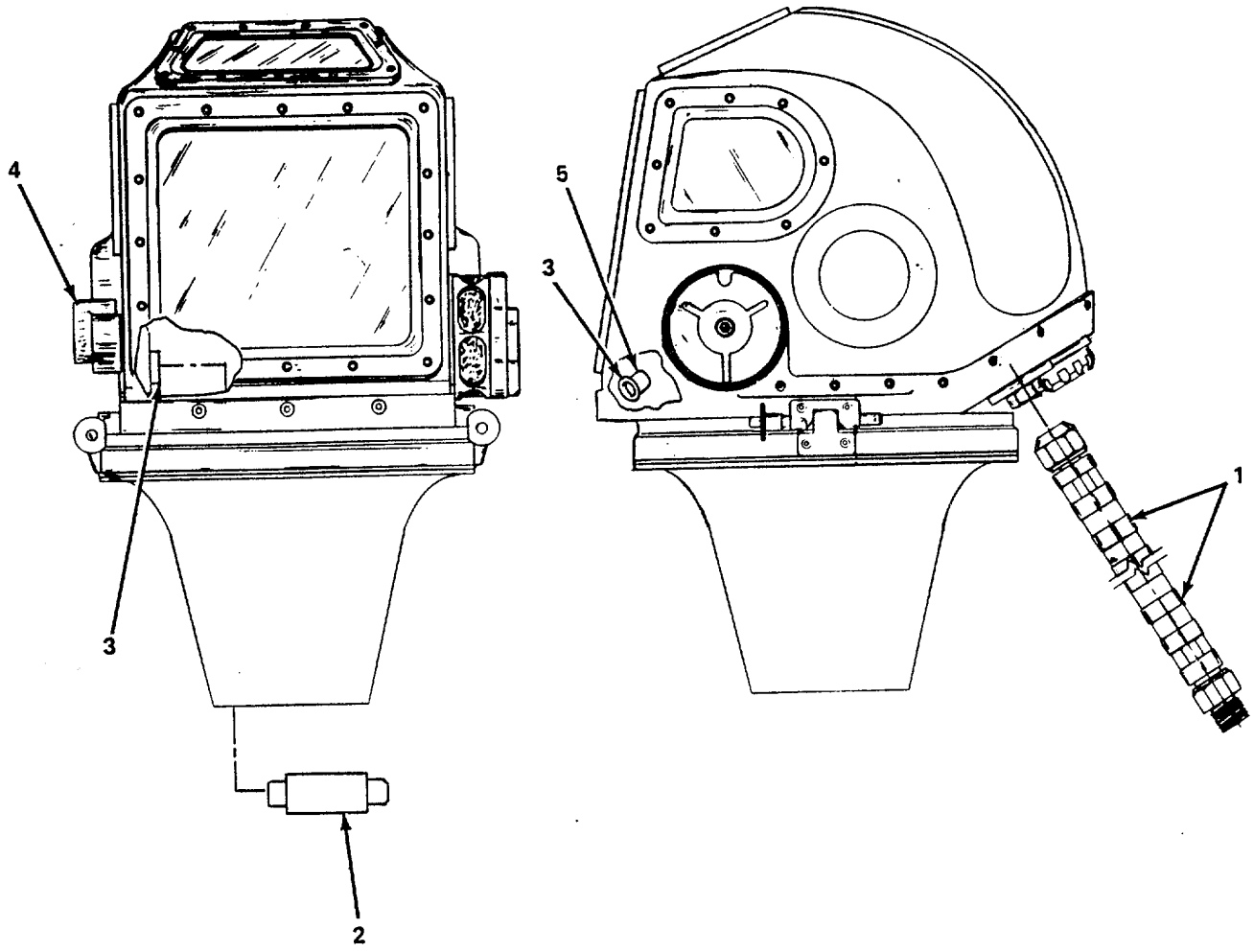


Figure 2-4. Relief Valve Test.

d. Drysuit Leak Test (figure 2-5).

NOTE

This is a quarterly planned maintenance function, premission function or as determined by operating conditions and the policy of the dive supervisor.

(1) Insert wrist plugs into each cuff from the inside of the sleeve and secure with wrist snappers.

(2) Ensure the zipper (1) is fully shut.

NOTE

Use only MK12 helmet whose P setting is known to be correct.

(3) Place the helmet (2)to be used on the frontviewport upon a rubber mat.

(4) Attach the drysuit (3)with lower breech ring (4) to the helmet assembly.

*(5) Remove the air supply adapter cap and gasket and install the air whip (5).

*(6) Connect an air supply to the air supply whip (5).

(7) Open helmet exhaust valve (6)fully.

(8) Open the helmet supply valve (7)approximately one-fourth turn.

(9) Adjust the helmet exhaust valve (6)until the suit (3)becomes rigid without ballooning.

(10) Apply a mild soap solution with a brush to the entire suit, paying particular attention to the seams and high wear areas.

(11) Mark any leak areas for repair.

(12) Rinse the suit thoroughly with freshwater to remove all soap solution.

(13) Shut the helmet air supply valve (7).

(14) Open the suit zipper (1).

(15) Detach the drysuit (3)from the helmet assembly (2).

(16) Repair as required.

(17) Prepare the next drysuit for leak testing. Repeat steps a, b, d, and g through p for each successive drysuit.

*(18) Secure supply air.

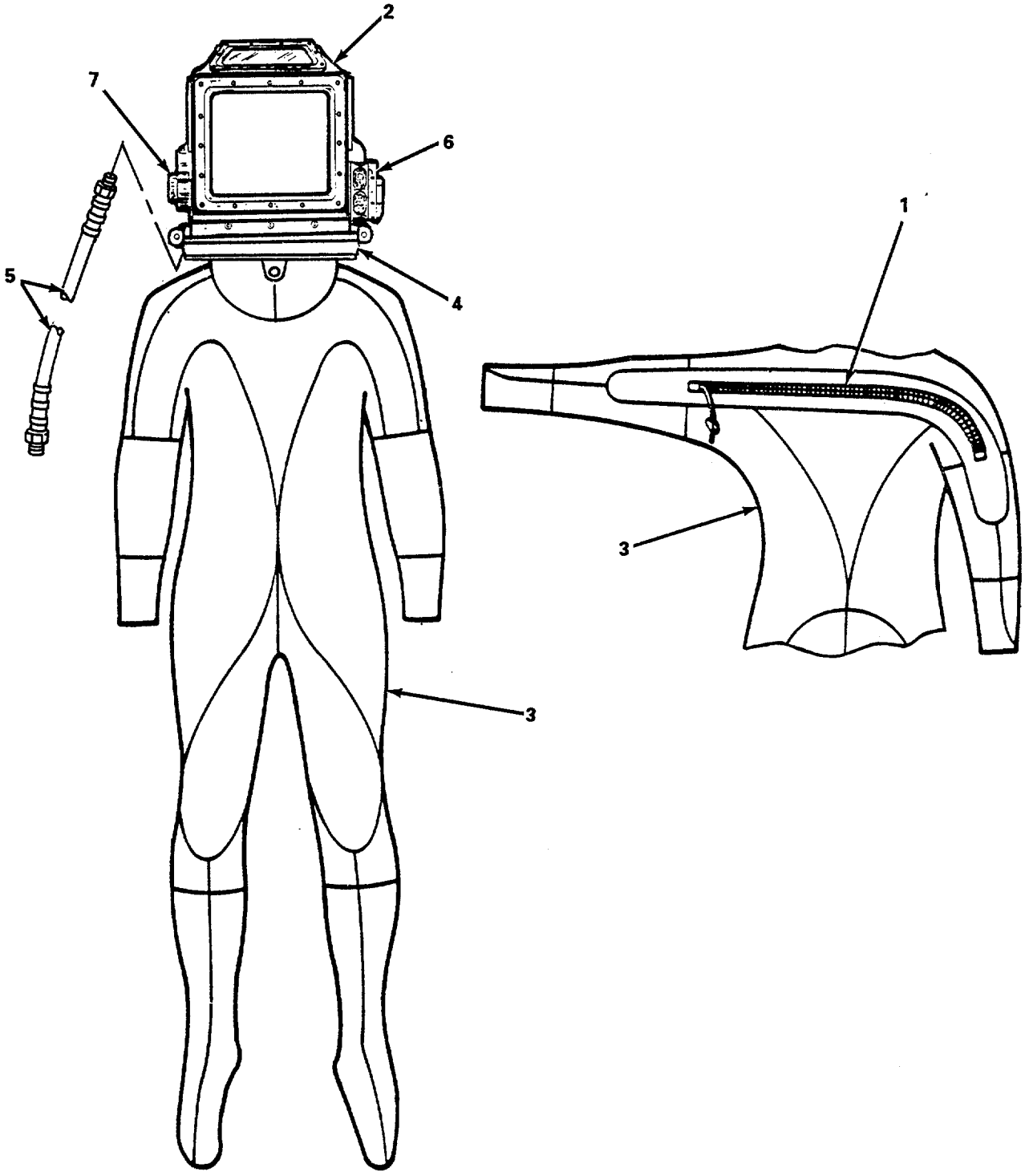


Figure 2-5. Drysuit Leak Test.

*(19) Remove the air whip (5) from the helmet (2) and install the protective cap and gasket on the helmet air adapter.

NOTE

Never stow a drysuit until it is thoroughly dry, inside and out.

*(20) Stow all equipment and tools.

e. Communications Check (figure 2-6).

NOTE

To be accomplished as a mission and daily predive procedure and following repairs to any communication component of the MK12 SSDS.

(1) Remove the protective cover or cap from the helmet communication whip (1) and umbilical cable (2).

(2) Ensure face seal O-ring is in place and in good condition. Lubricate lightly as necessary.

(3) Connect the helmet whip (1) and umbilical cable (2). Tighten the coupling nut set screw.

(4) Connect the umbilical cable (2) to the communication station (3).

(5) Ensure power source is correct; 120 Vac (grounded) or external 24 Vdc, internal source of 20 Vdc.

(6) With the aid of another diver, perform communications check to ensure proper tone quality and volume at the communication station and the helmet.

NOTE

If the above procedures were preparatory to a diving day, continue checking each helmet assembly to be used. Otherwise perform the following steps.

(7) Disconnect communication set from or secure the power source.

(8) Disconnect the helmet whip (1) and umbilical cable (2).

(9) Disconnect umbilical cable (2) from the communication station.

(10) Install the protective caps or covers.

(11) Stow all equipment and tools.

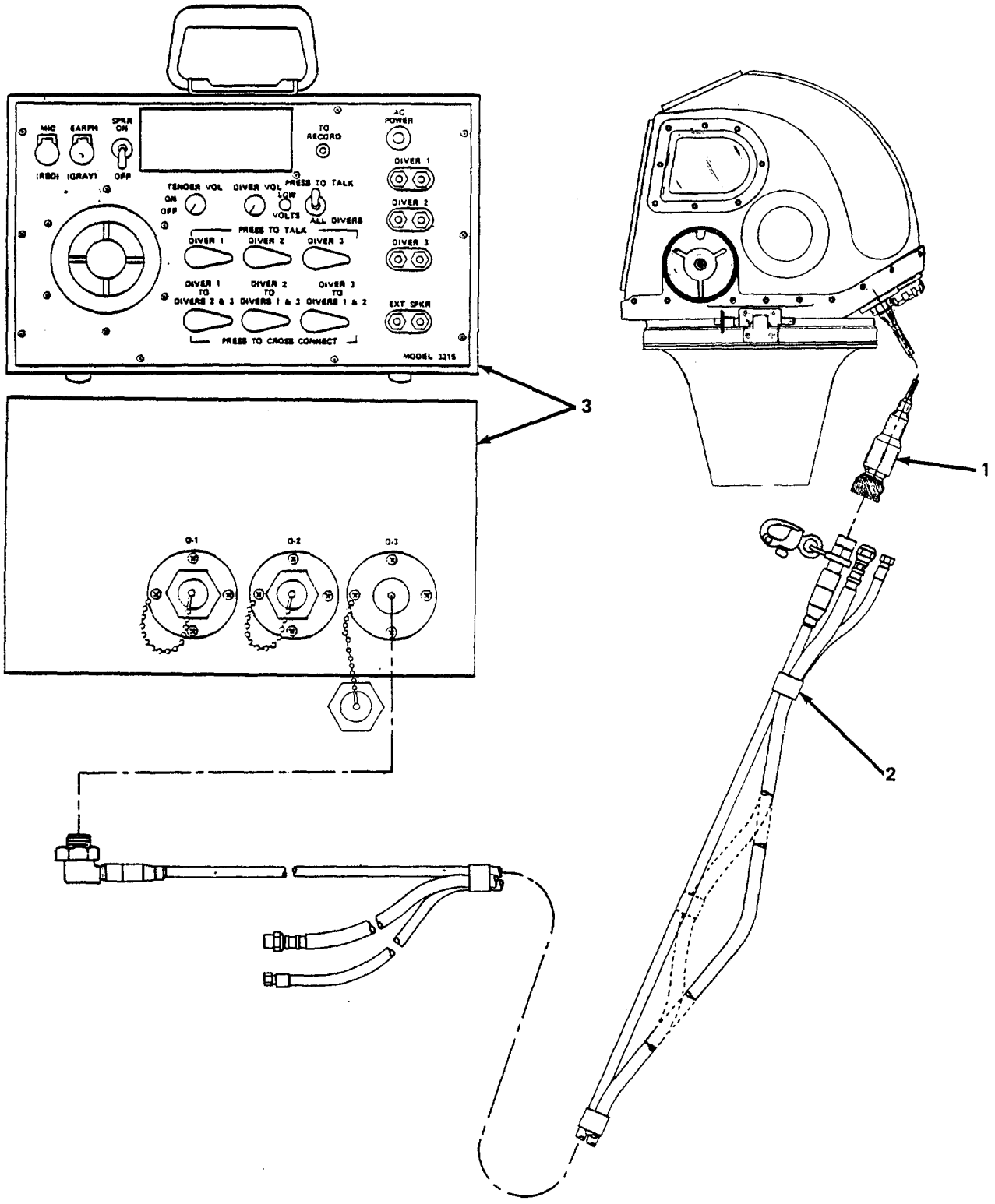


Figure 2-6. Communications Check.

SECTION III. OPERATION UNDER USUAL CONDITIONS

Paragraph Page

2-9. **General.** All procedures for MK12 SSDS air diving operations are presented in this section. Accomplishment of all listed procedures is required to initiate a dive mission. These procedures are based on experience, however, conditions, situations, and updated information may dictate revisions or changes. Daily predive procedures address those steps required for proper equipment care and repair at the end of a diving day, and mission predive procedures emphasizes procedures required less frequently than daily, but must be accomplished with an assured regularity to preclude equipment failure.

2-10. **Mission Predive Setup Procedures**. After completion of PMCS procedures in Section II, perform the procedures listed in Table 2-2, Mission Predive Setup Procedures. Mission predive setup procedures are to be performed at the beginning of a dive sequence (mission) or once a week which ever comes first.

WARNING

Arbitrary omission of steps could result in equipment failure and possible injury.

Table 2-2. Mission Predive Setup Procedure.

Step	Procedure
1. HELMET ASSEMBLY (External Checks)	**NOTE** Equipment requirements will be tailored to each dive mission. A briefing by the dive supervisor will indicate the specific requirements and all equipment for diving should be assembled on the diving station, including necessary support equipment such as tools and repair parts. The equipment must be laid out in an orderly manner and inspected and tested in accordance with these procedures. **NOTE** Always rest the helmet on a rubber mat when inspecting or testing. Place the helmet on a bench with the communication whip extended over the side to avoid sharp flexing of the whip. a. Supply Valve Check. (1) Remove the supply valve handle and ensure the packing gland nut is snug. Reinstall the valve handle. (2) Check the valve for smooth operation through its full range (approximately three turns). Ensure the valve handle is secured firmly to the valve stem. b. Exhaust Valve Check. **NOTE** Between missions, stow helmet with the exhaust valve in the adjustable configuration; backoff the valve handle (fully open) to remove tension on the spring. (1) Lay the helmet assembly on its right side with the exhaust valve facing up. (2) Check the exhaust valve in accordance with the applicable procedure below.

Table 2-2. Mission Predive Setup Procedure (Cont).

Step	Procedure
	c. Adjustable Exhaust Valve Check. (1) Remove the exhaust valve cover and inspect the valve body for dirt, corrosion, and damage. Replace if necessary. (2) Remove the chin button and poppet valve assembly. (3) Remove the diaphragm retainer and inspect the diaphragm for cuts, nicks, and deterioration. **NOTE** Use only enough lubricant to coat the item without excess. (4) Apply a light film of lubricant to the bead of the diaphragm. (5) Reinstall the adjustable diaphragm retainer. Ensure the diaphragm seats properly. **NOTE** In any case of deterioration to a preformed packing, remove and replace. (6) Inspect the exposed surface of the poppet preformed packing, ensuring it to be free of cuts, nicks, and deterioration. Apply a light film of lubricant to the exposed surface of the preformed packing. (7) Insert poppet valve stem through center hole of the body. Screw the chin button onto the stem; hand tighten. (8) Set the spring in place on the external end of the valve stem. 9) Turn the valve handle fully counterclockwise and install valve handle assembly and cover over the valve stem and spring. Ensure the spring is in place within the handle assembly. (10) Align the handle slot, cover screw hole and body screw hole. Thread a cover screw in until handle is free to turn 180°. (11) Thread second cover screw into place and tighten both cover screws evenly.Torque in accordance with torque limits.

Table 2-2. Mission Predive Setup Procedure (Cont).

Step	Procedure
	NOTE If handle is loose, tighten the friction drag screws until the desired action is achieved. (12) Rotate valve handle. Motion should be firm and have some resistance but operate smoothly through full range, approximately three turns. (13) Depress the chin button with finger pressure. Motion should be smooth with spring pressure increasing steadily. Upon releasing finger pressure, the valve should shut with spring tension. d. Ambient Exhaust Valve Check. (1) Remove the adjustable exhaust valve cover and inspect the valve body for dirt, corrosion, and damage. Inspect the diffuser for dirt or damage. Replace or clean parts as necessary (2) Remove the diaphragm retainer and inspect the diaphragm for damage and deterioration. (3) Apply a light film of lubricant to the bead of the diaphragm and install the diaphragm and ambient diaphragm retainer. Ensure the diaphragm seats properly. (4) Install the ambient exhaust valve cover. e. Air Adapter Assembly Check. (1) Remove the air adapter cap and filter screen. Inspect the adapter, screen, and cap for dirt, corrosion, and damage. Ensure the nonreturn valve is properly installed. (Do not remove the valve unless it is suspect.) Reinstall screen. (2) Visually inspect for loose or missing screws. Tighten or replace as required. f. Air Supply Whip. (1) Remove the protective caps from the air supply whip and inspect the air supply whip fittings for corrosion and damage. Inspect the gasket for wear or deterioration and lubricate lightly with an approved lubricant. Replace the gasket if required. (2) Install the whip to the helmet air adapter. Ensure it is right.

Table 2-2. Mission Predive Setup Procedure (Cont).

Step	Procedure
	g. Communications Whip Assembly. Remove the protective cap from the communications whip and inspect for damage, cuts, sharp bends, corroded contacts, and damaged threads.
2. HELMET ASSEMBLY (Intemal Checks)	a. Air Supply Assembly Check. (1) Check the air supply tubing connection for tightness. Inspect tubing for corrosion and crimps. (2) Remove the air supply diffuser assembly and inspect the adapter for cleanliness, corrosion and thread damage. Inspect the O-ring for nicks or deterioration. Replace if necessary. (3) Disassemble the supply diffuser assembly and inspect for dirt, oil, and moisture.Inspect threaded parts for corrosion or damage.Clean or replace parts as necessary. Replace the filter elements if necessary **NOTE** Do not reinstall diffuser assembly until relief valve test has been satisfactorily completed.
3. OPERATIONAL TEST	a. Relief Valve Test. Perform relief valve test in accordance with paragraph 2-8, c. b. Drysuit Leak Test. **NOTE** Leak test of the drysuit could be performed at any time. There is no hard fast rule for drysuit testing. Perform drysuit leak test in accordance with paragraph 2-8, d, as necessary.

2-11. **Daily Predive Procedures.** The following procedures, Table 2-3, Daily Predive Procedures, shall be performed before the start of each days diving operations.

WARNING

Arbitrary omission of steps could result in equipment failure and possible injury.

Table 2-3. Daily Predive Procedures.

Step	Procedure
1. HELMET ASSEMBLY (External Checks)	**NOTE** Equipment requirements will be tailored to each dive mission. A briefing by the dive supervisor will indicate the specific requirements and all equipment for diving should be assembled on the diving station, including necessary support equipment such as tools and repair parts.The equipment must be laid out in an orderly manner and inspected and tested in accordance with these procedures. **NOTE** Always rest the helmet on a rubber mat when inspecting or testing.Place the helmet on a bench with the communication whip extended over the side to avoid sharp flexing of the whip. a. Shell and Base Inspection. (1) Check base for cracks and breaks. Select an alternate helmet if necessary. (2) Visually inspect for loose, missing or damaged screws and stripped threads.Tighten or replace as necessary. b. Viewport Assembly Inspection. (1) Inspect viewports for scratches and chips. Replace as necessary.Scratches 1/32-inch deep and more than 1 inch long require replacement of viewport. (2) Inspect the viewport retainers for cracks, warping, broken screws, and stripped threads. Replace as necessary.

Table 2-3. Daily Predive Procedures (Cont).

Step	Procedure
	c. Locking Device Assembly Inspection. **NOTE** Apply only enough lubricant to coat item concerned without excess. (1) Ensure locking pins are in good condition and operate freely. Check that detent balls operate properly. Apply a light film of lubricant to locking pins. (2) Inspect locking pins for corrosion, bends or cracks. (3) Inspect helmet lugs for corrosion, dents, and loose or damaged mounting screws. d. Exhaust Valve Inspection. (1) Check exhaust valve in accordance with applicable procedure below. (2) Lay helmet assembly on its right side with exhaust valve facing up. e. Adjustable Exhaust Valve Check. **NOTE** If handle is loose, tighten friction drag screws until desired action is achieved. (1) Rotate valve handle.Motion should be firm and have some resistance but operate smoothly through full range, approximately three turns. (2) Depress the chin button with finger pressure. Motion should be smooth with spring pressure increasing steadily. Upon releasing finger pressure, valve should shut with spring tension. f. Ambient Exhaust Valve Check. (1) Remove exhaust valve cover and inspect valve body for dirt, corrosion, and damage.Inspect diffuser for dirt or damage. Replace or clean parts as necessary.

Table 2-3. Daily Predive Procedures (Cont).

Step	Procedure
	(2) Remove diaphragm retainer and inspect diaphragm for damage and deterioration. (3) Apply a light film of lubricant to bead of diaphragm and install diaphragm and ambient diaphragm retainer. Ensure diaphragm seats properly. (4) Install ambient exhaust valve cover. g. Breech Ring Check. (1) Set helmet on top viewport retainer and visually inspect breech ring for dents, nicks, and corrosion. Ensure preformed packing groove is clean. (2) Visually inspect breech ring for damaged, loose or missing mounting screws.If loose, tighten as necessary. (3) Inspect O-ring for nicks, cuts, deterioration and proper size. Apply a thin film of lubricant to preformed packing and install it in helmet breech ring groove. h. Air Supply Whip Check. (1) Remove protective cap from air whip; inspect the fitting for corrosion or damage. (2) Ensure gasket is in good clean condition. Replace if required. Apply a light film of lubricant. i. Communication Whip Assembly Check. Remove protective cap from communications whip and inspect for cuts, sharp bends, corroded contacts, and damaged threads.

Table 2-3. Daily Predive Procedures (Cont).

Step	Procedure
2. HELMET ASSEMBLY (Internal Checks)	NOTE Set helmet on its front viewport.Inspect helmet interior for overall cleanliness.There should be no evidence of foreign matter, oil or moisture, particularly on helmet liner. a. Ducting Check. (1) Ensure ducting is properly installed. (2) Inspect ducting open ends for dirt, oil, and moisture. b. Communication System Check. (1) Inspect the helmet wiring for cut or nicked insulation, and loose, dirty, and wet connections. (2) Ensure that earphones are clean, dry, and properly mounted in the retainers. (3) Ensure that microphone is clean, dry, and securely mounted. (4) Visually inspect the communication whip and umbilical cable assemblies for outer cover damage; chafing, abrasions, cuts, and blisters.Check for coupling damage, corrosion, dirt, oil, and missing or damaged preformed packing. (5) Connect the communication whip and communication station to the communication/strength cable.
3. OPERATIONAL TESTS	a. Vacuum Test. Perform vacuum test of the nonreturn valve in accordance with paragraph 2-8, a. b. P, Flow, and Leak Tests. Perform P, flow and leak tests, in accordance with paragraph 2-8, b. c. Communication Check. Perform a communication check between the helmet and station for proper communication and volume

Table 2-3. Daily Predive Procedures (Cont).

Step	Procedure
4. OPERATIONAL PREPARATIONS	a. Air Whip/Umbilical Hose. (1) Remove the protective cap from the diver end of the umbilical hose and inspect the fitting for corrosion or damage. (2) Inspect the hose gasket for damage or deterioration. Ensure it is lightly lubricated with an approved lubricant. (3) Connect the air whip to the umbilical hose. Tighten firmly using air wrenches. b. Defogger Application. **NOTE** Commercially available detergent, has proven to be an adequate defogging agent. Apply an approved defogger to the interior surfaces of the viewports. Wipe off any excess.
5. DRESS ASSEMBLY CHECKS	a. Jacking Harness. (1) Inspect jocking harness hardware for corrosion or damage. (2) Check the operation of the harness latch, latch locking pin, and strap adjusters.Ensure they operate freely and secure properly. Apply a light film of lubricant. (3) Inspect the harness webbing for frayed areas and worn or loose stitching. (4) Ensure grommets are in good, reliable condition. b. Drysuit. (1) Inspect the drysuit for tears, punctures, defective seams, and excessive wear. (2) Ensure the zipper teeth are not loose, damaged, corroded or misaligned. (3) Apply a thin film of lubricant to the zipper. Exercise the zipper to ensure free operation.

Table 2-3. Daily Predive Procedures (Cont).

Step	Procedure
	(4) Inspect the drysuit neck piece for excessive wear and deterioration. (5) Inspect the lower breech ring assembly for corrosion, damage, and loose or missing screws. c. Neckdam Assembly. (1) Inspect the neckdam for excessive wear and deterioration. (2) Inspect the lower breech ring assembly for corrosion, damaged, and loose or missing screws. d. Outer Garment. (1) Inspect the outer garment for tears, excessive wear, and loose stitching. (2) Ensure Velcro is in good condition. e. Boots and Gloves. (1) Inspect the gloves and boots for tears, excessive wear and deterioration. (2) Ensure the boot straps and hardware are securely fastened and in good operation condition.

2-12. **Equipment Donning Procedures**.

NOTE

The diving supervisor must ensure that PMCS and predive setup procedures have been completed before equipment can be donned.

Table 2-4 provides the procedural steps that must be followed when donning the MK12 SSDS in bottom and air neckdam configurations.

Table 2-4. Donning Procedures.

Step	Procedure
1. INVENTORY	Assemble and inspect the equipment. Lay the helmet face down on a rubber mat; take care not to damage the viewports, helmet, and breech ring lugs.
2. LUBRICATE	Apply lubricant to the drysuit zipper to avoid sticking. Wipe off the excess. Open the zipper fully, ensuring the lower breech ring is supported to prevent damaging the lugs or suit zipper.
3 DON THE DRYSUIT	Bottom Configuration. **NOTE** A thin pair of socks will facilitate donning and doffing the drysuit and prolong the life of the suit. a. From the sitting position, insert both legs through the drysuit zipper and work the suit to the hips with the breech ring held on the diver's lap or by the tender. b. Stand and work the arms into the sleeves. Roll cuffs under to ensure a watertight wrist seal. c. Place the suit breech ring down over the head. d. Hold arms up on front with elbows flexed while the tender closes the zipper. Ensure the zipper is fully closed by a sharp tug on the zipper tab. e. Drysuit is donned.
4. DON THE OUTER GARMENT	a. Fold the outer garment leg restrainers back and secure the Velcro ends to avoid tangling. b. Pull the outer garment on and press the Velcro wrist and ankle fasteners shut. c. Press the Velcro front closure shut while the diver holds the lower breech ring off his shoulders. d. Don the boots and secure front and rear straps with quick-release configurations.

Table 2-4. Donning Procedures (Cont).

Step	Procedure
5. DON THE JOCKING HARNESS	a. Straighten the jocking harness and secure the shoulder straps in place with the Velcro shoulder tabs. Snap the jocking straps into the breech ring jocking harness brackets. b. Wrap the harness chest strap Velcro tab around the left shoulder strap and press in place. c. Pull the crotch strap to the front and slide the waist belt link through the modified V-rings on the crotch strap and the front jocking strap. Fasten the waist belt latch and secure the locking pin. Ensure the waist strap is low on the diver's waist. d. Adjust the waist belt and shoulder straps. Adjust the crotch strap. Cross the rear jocking straps and, with the diver holding the front of the breech ring in position, adjust and secure both rear jocking straps.
6. INSERT WEIGHTS	a. Insert the thigh weights and calf weights into the pockets; insert hip weights if additional weight is required. b. Press the velcro pocket flaps shut and secure the wraparound thigh and calf restrainers.
7. INSPECT	With the diver fully dressed and ready to don the helmet, inspect to ensure the dress is correct in all respects.
8. DON THE HELMET	**WARNING** Ensure air is available to the helmet, and the air supply valve is opened slightly before placing the helmet on the diver. Exhaust valve shall be fully open. a. Seat the diver and lower the helmet into place taking care not to strike the diver's head, figure 2-7. Align the helmet (1) and lower breech ring lugs (2) and press the helmet firmly into place. b. Slide quick release pins (3) into place, figure 2-8 and secure with safety pins (4). c. Lead the umbilical and whips under the left arm to the V-ring at the waist. Secure with the spinnaker-type snap shackle, ensuring it is properly locked. Ensure quick release cord is attached and in good condition.

Table 2-4. Donning Procedures (Cont).

Step	Procedure
	d. front helmet jocking strap is adjusted by the diver to his preference. e. With the diver fully dressed, perform a communication check and establish desired air flow. Gloves are task dependent.
9. AIR NECKDAM DONNING	Air Neckdam Configuration. a. This configuration has no garment requirements other than the diver's preference. An undershirt is recommended which serves to minimize chafing by the harness. The system can be used with swim fins, wetsuit, weight belt or outer garment, and any combination of the above. b. The harness is donned in the same manner as for thedrysuit configuration. A lower breech ring with neckdam is placed over the head and secured to the jocking straps with the lower edge of the neckdam pointed upward around the neck. c. The helmet is put in place and secured in the same fashion as for the drysuit configuration. Gloves are task dependent.

2-13. **In-Water Operations**. Diving operations will be conducted at the work site according to the guidelines of the plan, and as directed by the diving supervisor. Diver air flow information is supplied in the following paragraphs.

2-14. **Air Flow Indication**. In the air configuration(open circuit), the amount of ventilation the diver is receiving is indicated by the MK12 flowmeter at the diving station. Since the flowmeter is calibrated in inches of water (inches of H20) and ventilation is determined in actual cubic feet per minute (ACFM), a conversion is required. Figure 2-9 shows the flow in ACFM at depth for specific flowmeter readings. To determine divers air flow, find diver's depth across the bottom of the graph. Determine the flowmeter gage reading and locate at the left of the graph. The diver ventilation is determined by locating these coordinates and interpolating between the curves.

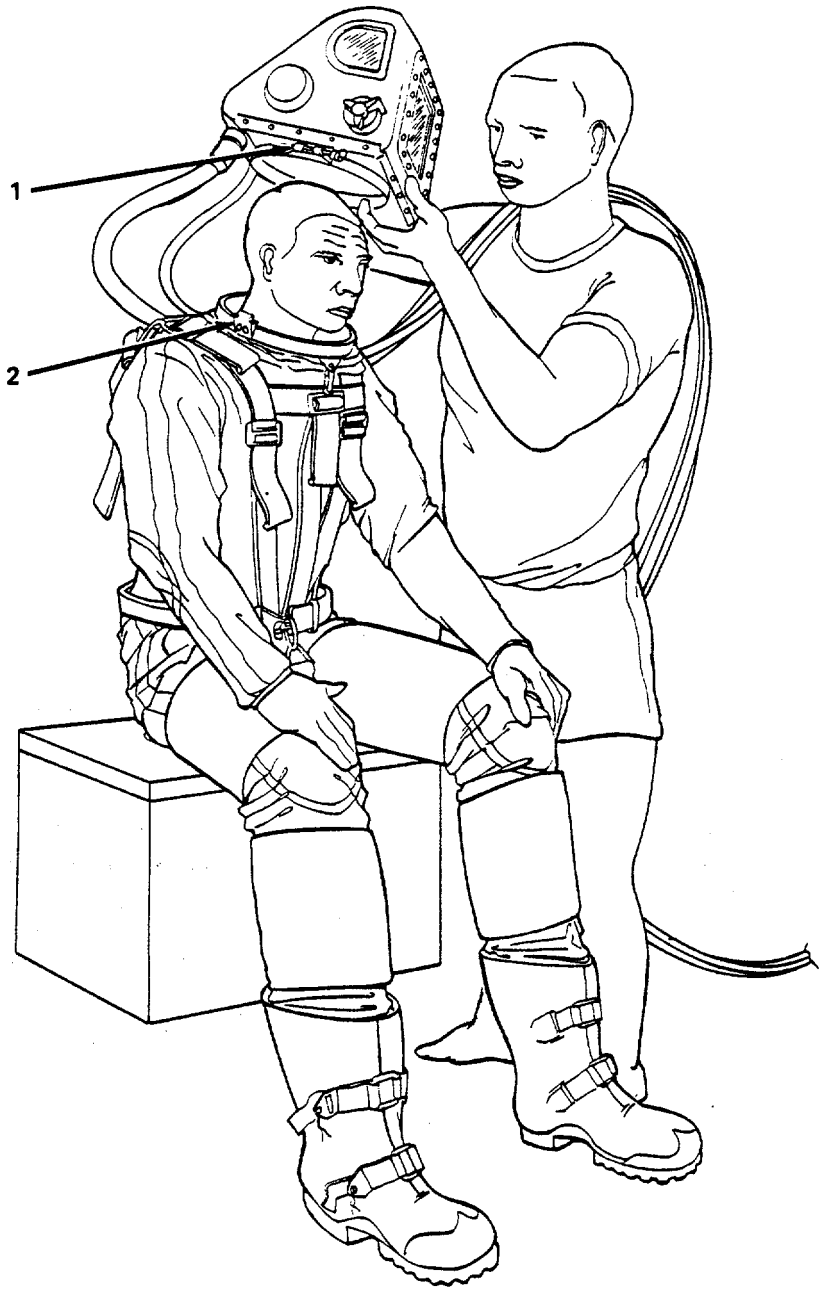


Figure 2-7. Helmet Placement.

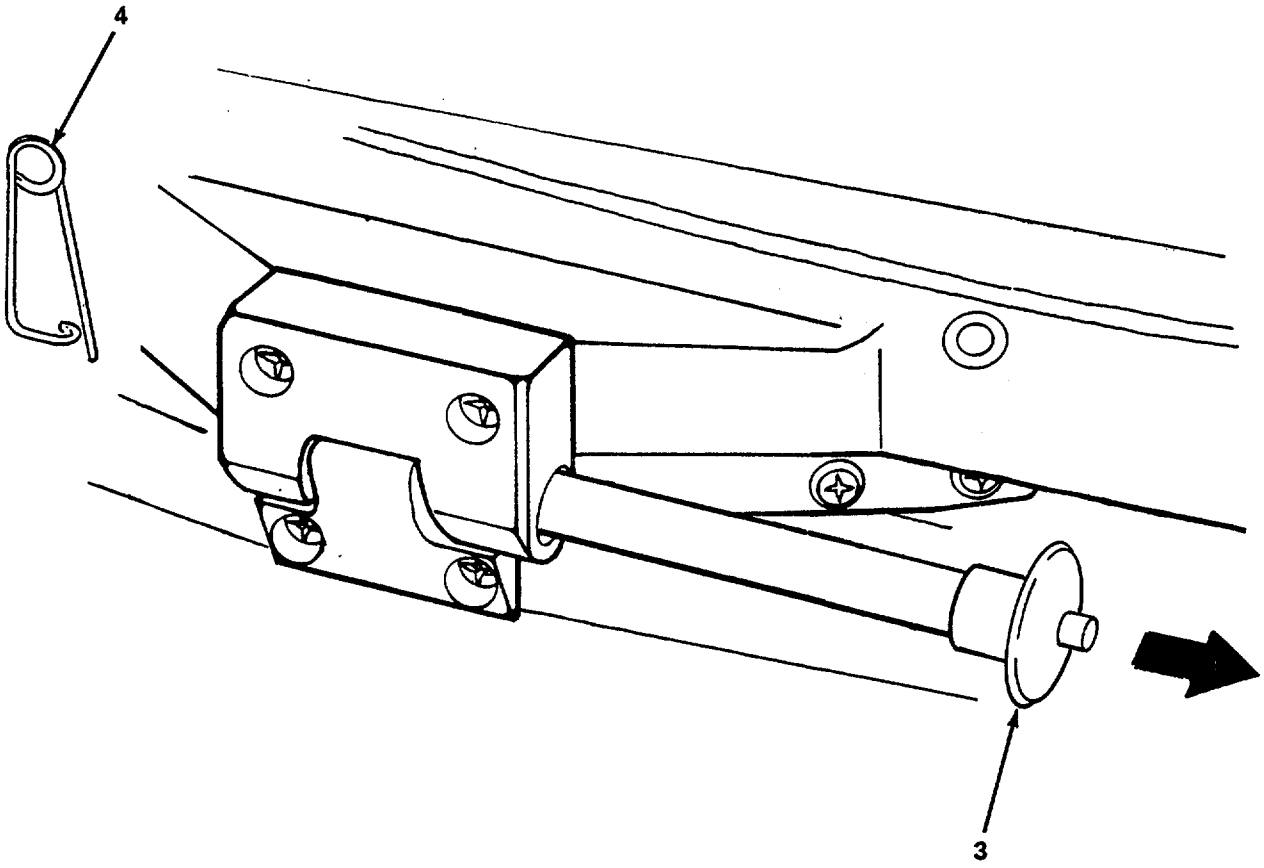


Figure 2-8. Helmet Locking Pin.

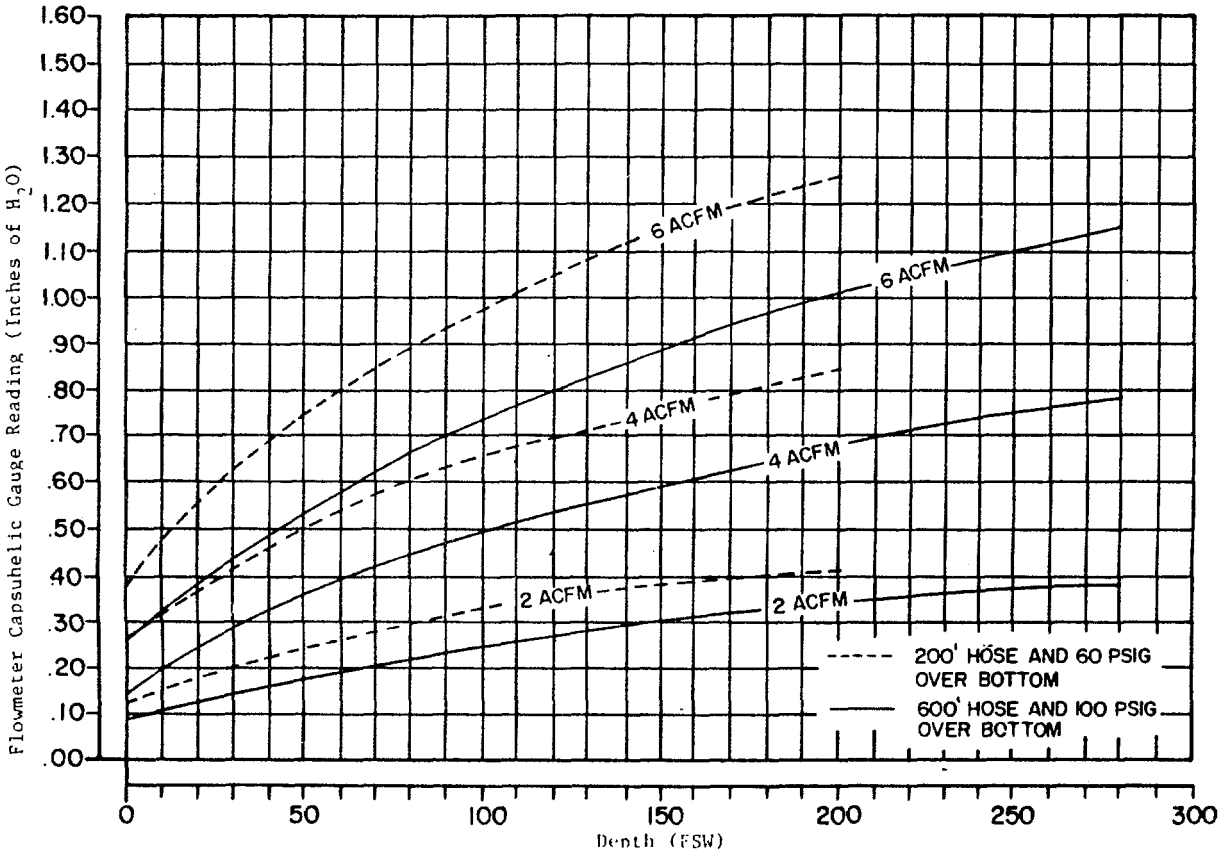


Figure 2-9. Flowmeter Readings for Controlled Overbottom Pressure.

2-15. **Overbottom Pressure Requirements**. The normal method of determining console operating pressure has been derived by adding 60 psig and 100 psig to depth pressure for 300 and 600-ft. hoses, respectively. However, there will be instances of limited compressor capability at the diving platform. Minimum compressor, or manifold pressure demands have been formulated to reduce overbottom pressure requirements while retaining the ACFM flow obligation.

The formula for the 300-ft. hose is:

(diver's depth (FSW) x .50) + 42 = minimum manifold pressure (psig)

The formula for the 600-ft. hose is:

(diver's depth (FSW) x .62) + 42 = minimum manifold pressure (psig)

Figure 2-10 is a graphic display of these formulas plotted in a straight line. There may be a small variation between formula results and graphic interpolation. In such cases, the greater pressure will be used. Figures 2-11, 2-12, and 2-13 are graphic displays of the flowmeter Capsuhelic gage readings for constant air supply pressures at depth. Figure 2-11 shall be used to determine the essential flowmeter gage readings (inches of H20) when a desired flow of 6 ACFM is required by the diver, utilizing the adjustable helmet supply valve. To find the proper flowmeter gage reading, locate the diver's depth (FSW) on the graph. If the depth is not exact, use the next greater depth represented on the graph. Follow the depth line up to the known constant manifold pressure (psig) line. If manifold pressure is not exact, use the next lowest pressure. To find the desired flowmeter reading (inches of H20), follow this intersection point (depth and pressure) to the left margin of the graph. These flowmeter Capsuhelic gage readings from the graph should always be rounded up to the next half-tenth (0.05) inch of H20 as an additional diver safety factor. Topside may instruct the diver to adjust the helmet supply valve until the flowmeter gage readout is at the desired setting. Figures 2-12 or 2-13 shall be used if flow rates of 4 ACFM or 2 ACFM are desired.

2-16. **Doffing Procedures**. The MK12 SSDS is most easily doffed in the sequence given in Table 2-5, Doffing Procedures. Doffing the bottom (drysuit) configuration consists of all the listed steps. Doffing the neckdam configuration consists of the steps marked by asterisk (*).

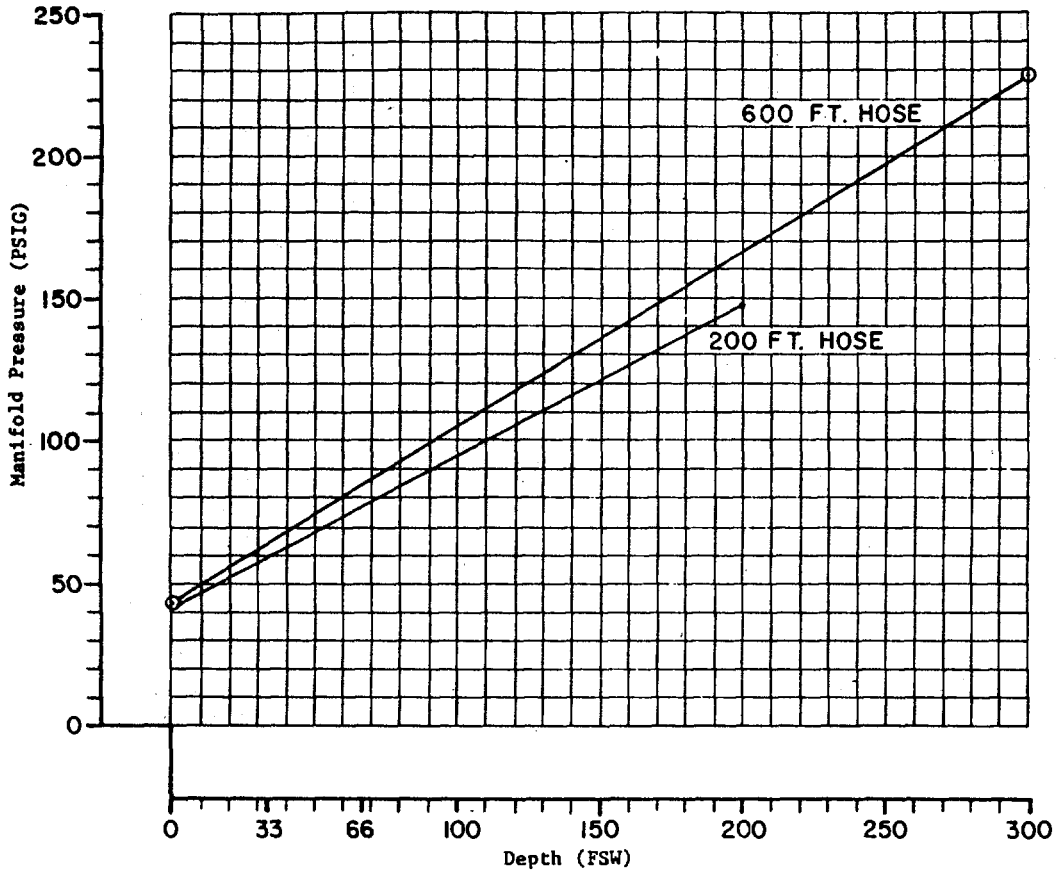


Figure 2-10. Manifold Pressure Requirements.

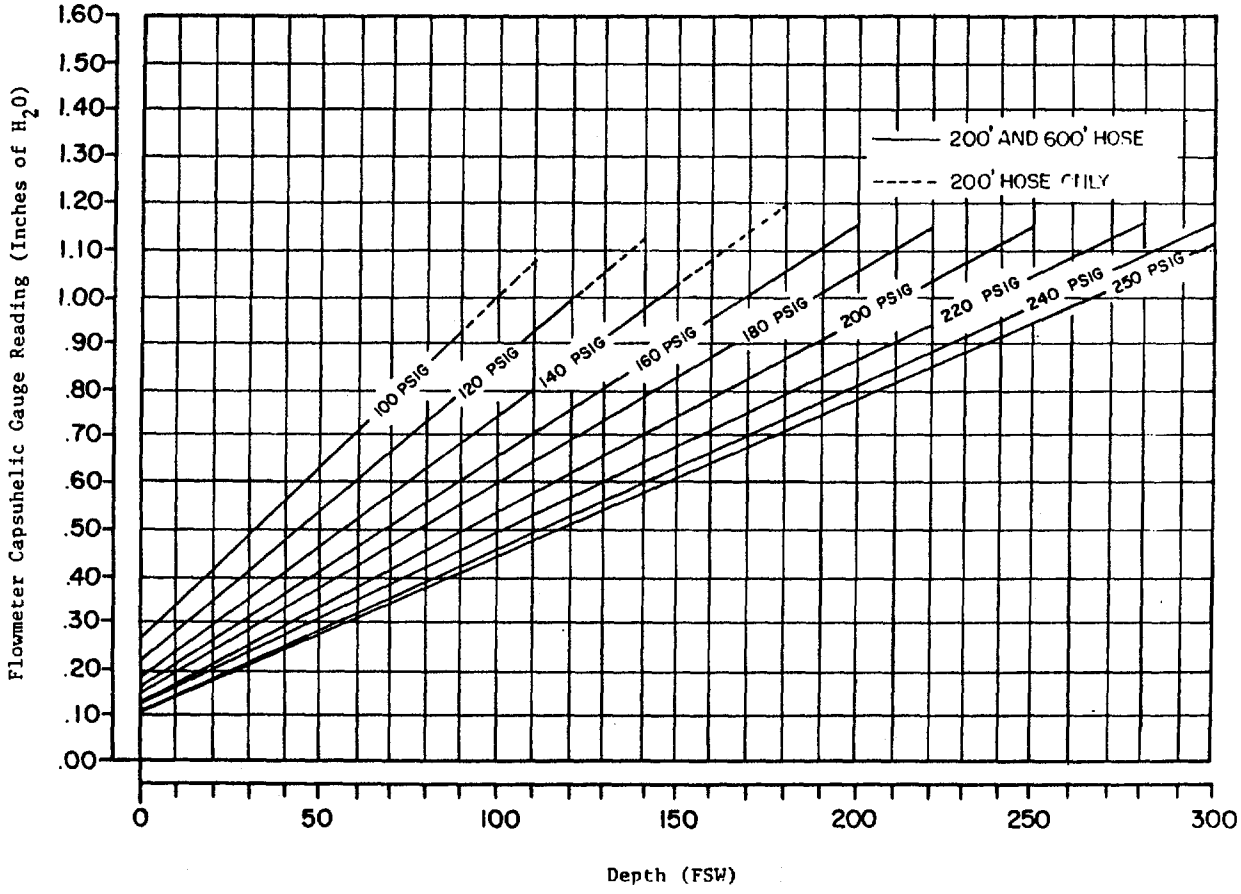


Figure 2-11. Flowmeter Readings for 6 ACFM with Constant Manifold Pressure.

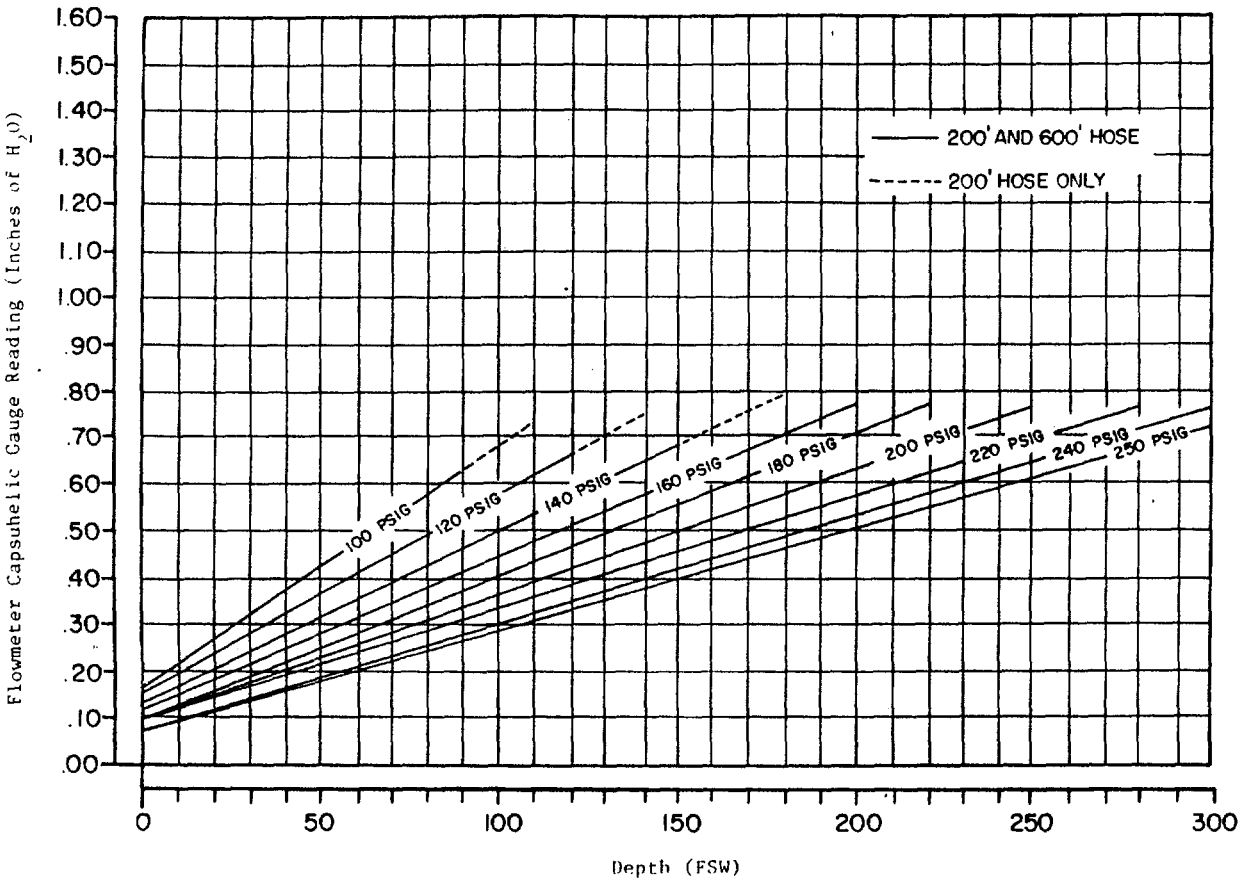


Figure 2-12. Flowmeter Readings for 4 ACFM with Constant Manifold Pressure.

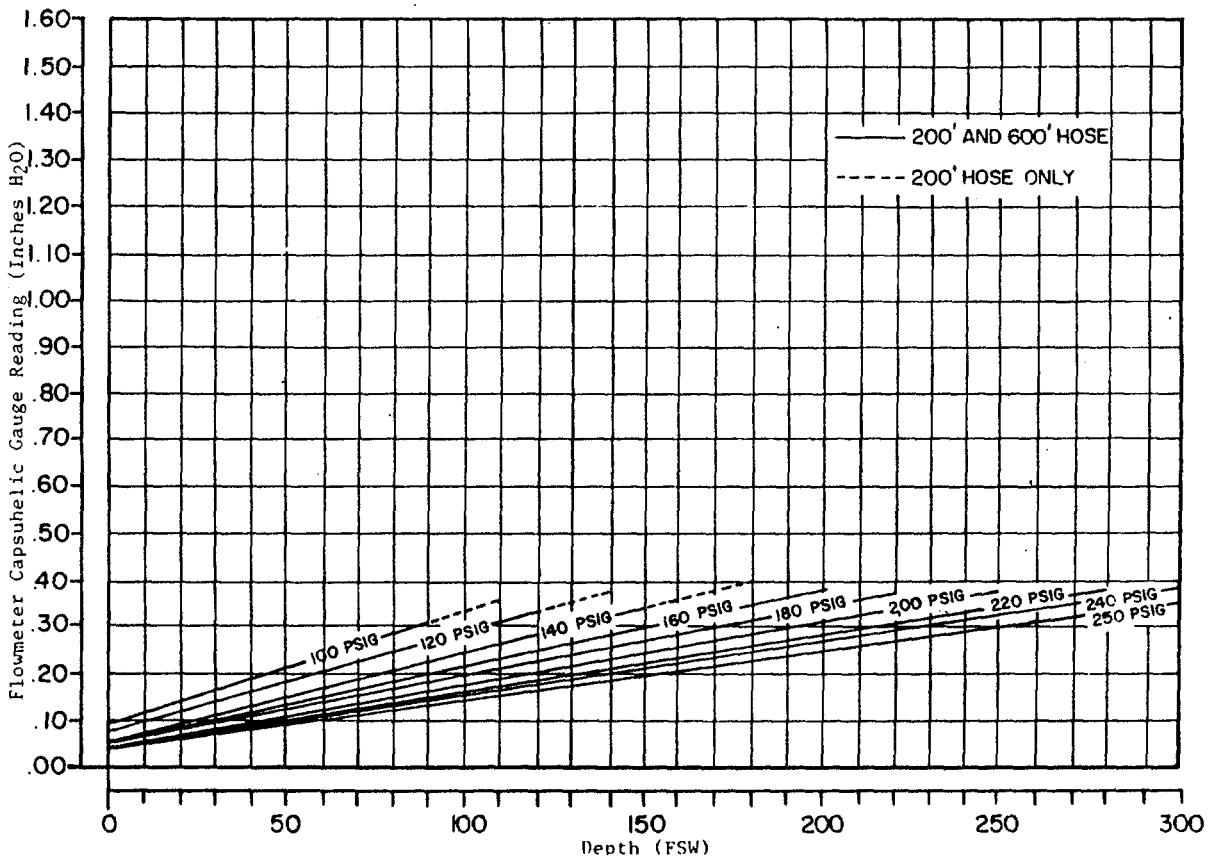


Figure 2-13. Flowmeter Readings for2 ACFM with Constant Manifold Pressure.

Table 2-5. Doffing Procedures.

Step	Procedure
*1. DOFF THE HELMET	a. Seat the diver. Ensure the air supply and exhaust valves are slightly open to continue delivering air to the diver until his helmet is removed. b. Open the spinmaker-type shackle and disconnect the umbilical strength member from the jocking harness. c. Depress helmet locking pin releases. Pull the pins clear of the lower breech ring lugs. d. Firmly grip the helmet and ease the helmet up and over the diver's head. e. Set the helmet down on the front viewport upon a rubber mat and open the supply valve to ventilate the helmet.
2. REMOVE THE WEIGHTS AND BOOTS	**NOTE** During surface decompression doffing procedures, weights are not removed. a. Open the thigh and calf restrainers, lift the pocket flaps, and remove all weights. b. Release straps and remove the boots.
*3. DOFF THE JOCKING HARNESS	**NOTE** The breech ring should be held at all times by the diver or tender to prevent damage. Withdraw the harness quick-release locking pin and open the waist belt latch. Disconnect the jocking straps from the lower breech ring. Open the shoulder tabs and chest strap, freeing the shoulder straps, and remove the entire harness.
4. DOFF THE OUTER GARMENT	a. Open velcro garment front and pull garment down over the diver's shoulders and below the hips. b. With the diver seated pull the outer garment off from the feet. Hang or drape garment to permit drying.
5. DOFF THE DRYSUIT	a. Open zipper with diver standing. The diver will pull breech ring up and maneuver his head out through the open zipper. Remove diver's arms, one at a time from suit. Pull suit down below diver's hips. b. Seat the diver and remove the suit over his feet. c. Hang or drape the drysuit to permit drying.

2-17. **Turnaround Procedures**. Table 2-6 provides steps to ensure safe and timely performance of turnaround procedures between dives.

Table 2-6. Doffing Procedures.

Step	Procedure
	This procedure assumes that the next diver has only to don the helmet to complete dressing.
1. DIVER ROTATION	a. Tend the diver carefully as he comes up and over andseat him on the diver's bench. b. Release the umbilical spinnaker type shackle and both helmet locking pins. c. Remove the helmet and place it face down on a rubber mat. d. Determine the diver's condition and report to the dive supervisor. e. Determine if there has been any malfunction or damage incurred during the dive. Adjust, repair, and replace components as necessary. f. Move the diver off the dive station to allow the next diver and tenders access to the bench and helmet.
2. HELMET CLEANING	a. Cleaning the helmet interior with an approved cleaning agent to guard against contamination from diver to diver, with special attention to the following. (1) Chin button (2) Front viewport (3) Area surrounding the microphone (4) Air diffuser and ear clearing pad (5) Front helmet base interior
3. HELMET PREPARATION	a. Check the breech ring preformed packing for dirt or grit. Clean and lubricate as needed. b. Check the locking pins for dirt or grit. Check for proper, free operation. Clean and lubricate as needed. c. Check the adjustable exhaust valve and air supply valve for smooth operation through full range. Check the chin button for proper, free operation. d. Inspect the viewports for damage. Dry and apply defogger as necessary.

Table 2-6. Doffing Procedures (Cont).

Step	Procedure
4. DIVER PREPARATION	**WARNING** Ensure the air supply valve is open slightly and the exhaust valve is fully open before placing the helmet on the diver. a. Carefully place the helmet over the diver's head and press firmly into place. Lock the pins securely. b. Fasten umbilical spinnaker-type shackel to harness V-ring. c. Perform communication check with topside and partner, if applicable.

2-18. **Postdrive Procedures**. The procedural steps required for systematic accomplishment of postdive actions are separated into two procedures and presented in Table 2-7, Postdive Procedures. Daily Postdive Procedures, addresses those steps required for proper equipment care and repair at the end of a diving day, and Mission Postdive Procedures, emphasizes procedures required less frequently than daily but must be accomplished with an assured regularity to preclude equipment failure. Mission postdive procedures are to be performed at the end of a dive sequence (mission) or once a week, whichever occurs first. Mission postdive procedures must include all postdive procedural steps, both daily and mission requirements, to ensure completeness of equipment preparation before further usage or stowage. All items and steps must be accomplished upon mission completion. The dive supervisor may deem it necessary to perform some daily or mission procedure steps more frequently. The table must be considered only as guides to minimum requirements, not as all-inclusive.

Table 2-7. Postdive Procedures.

Step	Procedure
1. HELMET CLEANING	**NOTE** Report any discrepancies to the diver supervisor. a. Clean the helmet interior with an approved cleaning agent. The major cleaning points are: (1) Chin button (2) Area surrounding the microphone (3) Front viewport (4) Air supply diffuser and ear clearing pad (5) Front helmet base interior

Table 2-7. Postdive Procedures (Cont).

Step	Procedure
2. EXHAUST VALVE	The dive supervisor shall determine the extent of the daily exhaust valve inspection. If dive conditions were in turbid or polluted water, mission postdive procedures for disassembly and cleaning should be implemented. For normal diving operations, the following steps shall be performed to prepare the exhaust valve for the next diving day. a. Rinse the exhaust valve thoroughly with freshwater. b. Wipe or blow dry exhaust valve. c. Rotate valve handle. Motion should be firm, with slight resistance, and operate smoothly throughout full range, approximately three turns. d. Cycle the chin button assembly by depressing the chin button with finger pressure. Motion should be smooth with spring pressure increasing steadily. Upon releasing finger pressure, valve should shut with spring tension. e. Report any discrepancies to the dive supervisor.
3. AIR SUPPLY VALVE CHECK	Check the valve handle motion. Motion should have some resistance but operate smoothly.
4. COMMUNICATIONS WHIP AND CABLE CHECK	a. Disconnect communication whip from the umbilical cable. Check preformed packing and connections for damage; ensure that connections are clean and dry. b. Place dust cover on communication whip and umbilical cable connectors.
5. UMBILICAL HOSE AND WHIP CHECK	a. Disconnect hose from air whip. b. Inspect air whip couplings and gaskets. Repair or replace as necessary. c. Install protective caps and plugs as required.
6. GARMENT PREPARATION	a. Inspect the drysuit(s) for abrasions, cuts or tears. Repair as necessary. b. Inspect the zipper for missing or misaligned teeth. Ensure the zipper operates properly.

Table 2-7. Postdive Procedures (Cont).

Step	Procedure
	CAUTION Exercise care not to damage the lower breech ring or lugs. c. Rinse, with freshwater, all dress assembly items assembled on the diving station. **NOTE** Ensure outer garment pockets are flushed out. d. Allow all items to thoroughly dry both inside and out prior to stowage. e. Stow garments in a cool dry place. Drape the garments or put on hangers. Do not fold drysuits. **NOTE** Report any discrepancies to the dive supervisor when conducting the following mission postdive procedures.
7. HELMET CLEANING	a. Clean the helmet interior with an approved cleaning agent. The primary cleaning areas are: (1) Chin button (2) Microphone and surrounding area (3) Viewports (4) Air supply diffuser and ear clearing pad (5) Front helmet base interior b. Carefully remove helmet liners by pulling evenly on Velcro fasteners. c. Rinse liners and helmet interior with freshwater. Wipe or blow dry thoroughly. d. Remove, clean, dry, and reinstall mixed gas ducting. e. Reinstall dry helmet liners properly.
8. EXHAUST VALVE STOWAGE PREPARATION	The helmet is stowed with the adjustable valve in place, fully opened, for cleanliness and valve body protection.

Table 2-7. Postdive Procedures (Cont).

Step	Procedure
8. EXHAUST VALVE STOWAGE PREPARATION	The helmet is stowed with the adjustable valve in place, fully opened, for cleanliness and valve body protection. a. Remove the chin button. b. Line up the valve handle cutout with the two cover assembly screws and remove the screws. c. Remove the cover assembly, spring, and poppet assembly. d. Remove the diaphragm retainer and diaphragm. e. Remove the diffuser. f. Wash all parts with freshwater and wipe or blow dry. g. Lightly lubricate the poppet preformed packing. h. Reassemble for the adjustable exhaust valve assembly in preparation for helmet stowage. i. Stow adjustable exhaust valve in fully open position to reduce spring tension and the possibility of flattening the poppet disc preformed packing.

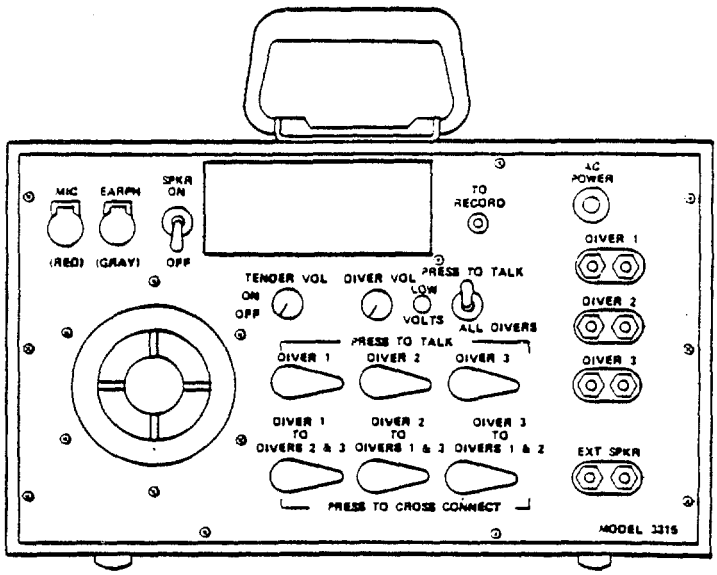
2-19. **Divers Intercommunications Set**. The divers intercommunication set, figure 2-14, is an intercommunication system between a surface tender and one, two, or three divers. Divers voices are continuously received by the surface tender. The surface tender can communicate with all divers through the controls on the front panel.

a. *Operation*. There are several options available in how the unit is operated. The tender can use either the speaker (combination reproducer/microphone) mounted in the unit's front panel or the headset (furnished with the unit) for communication with the divers. The divers' communications cables can be connected to the unit using either banana jack receptacles on the front panel or the deep sea connectors located on the rear panel, figure 2-14.

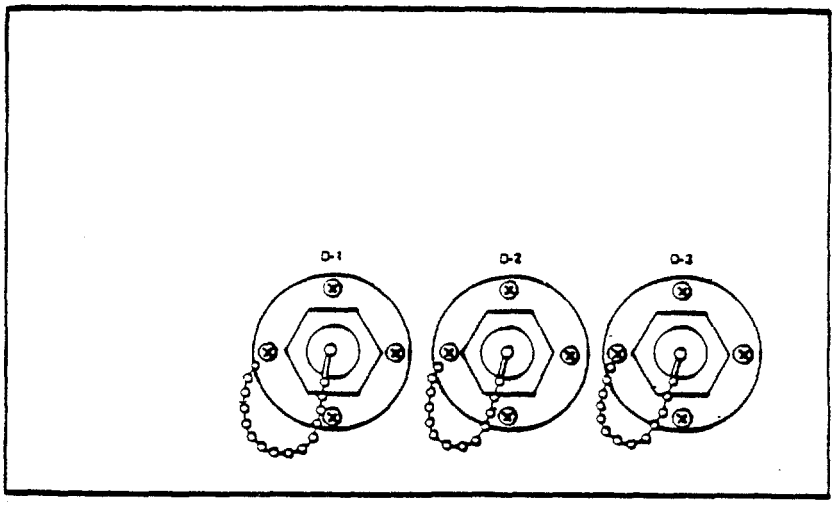
(1) *Turn-on procedures.* To turn the unit on, rotate the TENDER VOL switch to the ON position. The LOW VOLTS lamp will flash once and then extinguish. This signifies that the unit is on and ready for operation. Should the lamp remain illuminated, the battery voltage is low and the battery pack should recharged.

(2) *Normal communication procedures*. To use the internal speaker, flip the SPKR ON-OFF switch to the ON position. When the TENDER VOL switch is rotated clockwise, the volume of diver's voice(s) being monitored will increase. There is also a volume control for the diver's earphones. When the DIVERS VOL switch is rotated clockwise, the volume in the diver's earphones will increase.

The unit operates on the push-to-talk principle. There are spring-loaded switches on the front panel which the tender depresses in order to talk to the divers or to enable one diver to talk with the other diver(s). When none of these switches are depressed, the tender hears all three diver channels. If the tender desires to speak to all the divers simultaneously, he depresses and holds the PRESS TO TALK ALL DIVERS switch. If the tender desires to speak to any one diver individually, he depresses and holds the appropriate PRESS TO TALK switch; i.e., DIVER 1 switch to speak to diver one. DIVER 2 switch to speak to diver two, and DIVER 3 switch to speak to diver three.



FRONT



BACK

Figure 2-14. Divers Intercommunication Set.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

2-20. **General**. This section provides procedures that are to be followed if faced with an equipment failure during operations. Situations may occur that are not covered in these procedures. If so, follow unit operating procedures or consult tender or diving supervisor.

2-21. **Emergency Procedures**.

WARNING

If an underwater emergency occurs, notify dive station and dive partner immediately. Do not ditch the diving helmet. Failure to follow prescribed emergency procedures may result in injuries to personnel.

a. Air Supply Valve Jammed Open.

WARNING

To prevent the valve from jamming under normal conditions, the supply valve should never be fully shut or fully opened.

(1) Depress the chin button and open exhaust valve to prevent over inflation. Inform topside.

(2) Attempt to shut the valve; have dive partner attempt to shut supply valve.

(3) Attempt to crimp whip hose to reduce flow.

(4) If supply valve cannot be shut, diver's air flow will be controlled by topside. Ascend as directed.

b. *Air Supply Valve Jammed Shut*.

(1) Shut the exhaust valve while attempting to open the air supply valve. Inform topside.

(2) Insert pneumofathometer hose under drysuit cuff or neck dam and request a continuous vent.

(3) Have dive partner attempt to open the air supply valve. Ascend as directed.

c. *Unable to Adjust Air Supply Valve*. Control air volume with the exhaust valve. Inform topside of the situation.

d. *Helmet Locking Device Failure.*

(1) Hold helmet in place and inform topside.

(2) Attempt to resecure helmet locking device.

(3) Ascend as directed.

e. *Loss of Buoyancy Control*.

(1) Diver blowup.

(a) Shut the air supply valve, depress the chin button, hold hands over the head, and vent from the suit cuff. Pull one cuff open if required.

(b) Adjust the air supply valve and exhaust valve to regain buoyancy control. Notify topside of the incident.

(2) Diver falling.

(a) Open the air supply valve fully (do not jam open) and pull the chin button closed to halt descent.

(b) Adjust the air supply valve to regain buoyancy control. Notify topside of the incident.

f. *Jocking Harness Failure*.

(1) Hold helmet in place; inform topside and dive partner.

(2) Ensure ability to properly operate the chin button.

(3) Maintain buoyancy control and ascend as directed.

CHAPTER 3

OPERATOR MAINTENANCE

OVERVIEW

This chapter contains operator level maintenance instructions and troubleshooting procedures for the MK12 Surface Supported Diving System (SSDS). There is no maintenance to be performed at the operator level. Troubleshooting is limited to component fault isolation and simple corrective actions.

SECTION I. LUBRICATION INSTRUCTIONS

This section is not applicable.

SECTION II. OPERATOR'S TROUBLESHOOTING

3-1. **General**. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the MK12 SSDS equipment. Inspections are provided to isolate the faulty item and corrective actions are provided to eliminate the malfunctions.

3-2. **Operator's Troubleshooting**. Refer to the symptom index for the troubleshooting procedure of the observed malfunction.

a. Table 3-1 lists the common malfunctions which you may encounter during operation of the equipment.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. Notify your supervisor if the corrective actions do not correct the malfunction.

SYMPTOM INDEX

Table 3-1. Operator Troubleshooting Procedures.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. REDUCED AIR FLOW

Step 1. Check air supply valve.

Adjust air supply valve.

Step 2. Check exhaust valve.

Adjust exhaust valve.

Step 3. Check air whip connection.

Tighten loose connection.

2. UNABLE TO INCREASE AIR FLOW.

Step 1. Check air supply valve.

Adjust air supply valve.

Step 2. Check exhaust valve.

Adjust exhaust valve.

Step 3. Check air whip connection.

Tighten loose connection.

SECTION III. OPERATOR MAINTENANCE PROCEDURES

This section is not applicable.

CHAPTER 4

UNIT MAINTENANCE

OVERVIEW

This chapter contains unit level preventive maintenance checks and services, troubleshooting, maintenance, and instructions for placing the equipment into storage, or ready it for shipment.

SECTION I. REPAIR PARTS; SPECIAL TOOLS; TEST MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

4-1. **Common Tools and Equipment**. For authorized common tools and equipment, refer to the Modified Table of Organization and equipment (MTOE) applicable to your unit.

4-2. **Special Tools, TMDE, and Support Equipment**. Refer to Repair Parts and Special Tools List (RPSTL) and the Maintenance Allocation Chart pertaining to unit maintenance for the MK12 Surface Supported Diving System (SSDS).

4-3. **Repair Parts**. Repair parts are listed and illustrated in the RPSTL, TM 5-4220-225-24P, for this equipment.

SECTION II. SERVICE UPON RECEIPT

4-4. **General**. This section provides information and procedures for the receipt, installation, and testing of the MK12 SSDS.

4-5. **Initial Inspection**. Upon receiving the MK12 SSDS, all parts should be inspected and tested. The equipment may not be ready for immediate operational use and some parts may require special preparation.

a. *Inventory*. Upon receiving the equipment an inventory should be completed. To ensure receipt of all items, the shipment should be compared with packing lists included in the shipping documentation.

b. *Inspection*. Remove each item from the shipping container and perform a thorough inspection for any deviation from good manufacturing and packaging processes, such as incompleteness of assembly, faulty. workmanship, rust, dirt, delamination, cracks, deterioration, and corrosion. Specific items to be inspected are indicated in the following subparagraphs.

(1) *Helmet assembly*. The helmet assembly of the MK12 SSDS is inspected to ensure all components are present and in a condition suitable for use according to U.S. Army specifications.

(2) *Dress assembly*. Inspect the dress assembly, (drysuit, outer garments, boots, gloves, and weights) to ensure components are present and in proper amounts. Ensure that all items are free from damage and serviceable.

(3) *Support equipment*. Inspect support equipment to ensure that all components are present in proper amounts. Ensure that all items are free from damage and serviceable. Support equipment consists of all items necessary for diving operation's in excess of a fully assembled helmet and dress assemblies. Included are the following individual items of equipment:

Umbilicals
Communication Cable Adapters
Test Set and Tools
Spare Parts Kit, Helmet Assembly
Repair Kit, Dress Assembly
Spare Parts Kit, Support Equipment
Shipping and Stowage Containers

c. *Maintenance Check*. Examine maintenance records accompanying the shipment to verify that required preventive maintenance checks and services have been performed. Perform all preventive maintenance checks and services as scheduled before operational use of the equipment.

4-6. **Operational Testing**. Prior to operating the MK12 SSDS, it will be tested according to the procedures specified in Chapter 2, Operating Instructions.

SECTION III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-7. **Preventive Maintenance Checks and Services (PMCS)**. PMCS are covered in Chapter 2, Operating Instructions.

SECTION IV. UNIT TROUBLESHOOTING

4-8. **General**. This section contains troubleshooting and corrective action procedures authorized at the unit maintenance level (see appendix B, MAC).

4-9. **Unit Troubleshooting**. Refer to the symptom index to locate the troubleshooting procedure for the observed malfunction. Table 4-1 lists malfunctions that may occur during operation or maintenance of the MK12 SSDS. Tests, checks, inspections, and corrective actions should be performed in the order listed. If a malfunction beyond the scope of unit maintenance is discovered, refer the malfunction to the next higher level of maintenance.

NOTE

This table is not intended to cover every possible symptom, but is rather a list of the more frequent problems and some of their causes and are presented in the order they are most likely to occur.

SYMPTOM INDEX

Table 4-1. Unit Troubleshooting Procedures.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. LOSS OF COMMUNICATION, ALL DIVERS.

    Step 1. Check power connection.

        Repair defective connection.

    Step 2. Check external power supply.

        Replace external power supply.

    Step 3. Check for defective communication box.

        Repair or replace defective box.

2. LOSS OF COMMUNICATION, ONE DIVER.

    Step 1. Check diver cable on alternative connection.

        Replace defective box (para. 4-32).

    Step 2. Inspect umbilical.

        Replace a defective umbilical (para. 4-31).

    Step 3. Check connections.

        Clean, flush, dry and lubricate.

    Step 4. Perform continuity check of helmet wiring.

        Repair or replace helmet communications (para. 4-26).

3. LOSS OF COMMUNICATION BETWEEN DIVERS.

    Step 1. Connect either diver to unused diver connection, retest.

        If communication is restored, replace communication box (para. 4-32).

    Step 2. Connect other diver to other divers original connection, retest.

        If communication is restored, replace defective communication box (para. 4-32).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. WEAK OR INTERMITTENT SENDING AND RECEIVING, ONE DIVER.

Step 1. Move affected diver's communication cable to another connection on the communication box.

If communication is restored, replace communication box (para. 4-31).

Step 2. Check preformed packing at whip connection.

Clean, flush, dry and lubricate.

Step 3. Visually inspect communication cable connectors and helmet connector for corrosion, water, dirt, and poor solder connections.

Step 4. Perform continuity checks of communication cable, whip, and helmet wiring. Flex the wires to expose possible intermittent connection.

Repair defective connection or replace defective cable, whip or helmet wiring (para. 4-26, 4-27 and 4-31).

5. TOPSIDE DOES NOT RECEIVE ONE DIVER OR RECEPTION IS WEAK OR INTERMITTENT.

Step 1. Move affected diver's communication cable to another connection on the communication box.

If reception is normal, replace communication box (para. 4-32).

Step 2. Visually inspect helmet communication for loose or dirty microphone connections.

Clean and tighten microphone connections.

Step 3. Perform continuity checks of microphone leads.

Repair or replace helmet communications (para. 4-26).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. ONE DIVER DOES NOT RECEIVE TOPSIDE.

Step 1. Move affected diver's communication cable to another connection.

If reception is restored, replace communication box (para. 4-32).

Step 2. Visually inspect earphone connection for corrosion, dirt, water, and tightness.

Clean and tighten earphone connections.

Step 3. Perform continuity checks of earphone and leads.

Repair or replace helmet communications (para. 4-26).

7. VACUUM TEST DOES NOT MEET REQUIREMENTS.

Step 1. Remove the air supply valve from the adapter and inspect for foreign matter.

Clean, reinstall and retest.

Step 2. Vacuum test another helmet.

If test is good, check for loose fittings and correct. Retest.

Step 3. Inspect for loose connections.

Tighten connection and retest.

Step 4. No reading on gage.

Replace gage on quick-disconnect fitting and retest.

Step 5. Replace faulty vacuum pump and retest.

If retest meets requirements, action is completed.

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

8. REDUCED AIR FLOW.

Step 1. Check console pressure.

Adjust console pressure to proper level.

Step 2. Visually inspect the hose for kinks.

Remove any kink.

Step 3. Inspect air hose for damage.

Replace or repair damaged hose (para. 4-30).

Step 4. Inspect the filter screen for clogging.

Inspect the entire air supply system to determine the source of the foreign material.

Step 5. Inspect the one way valve for clogging.

Replace one way valve (para. 4-19).

Step 6. Inspect the air supply tubing assembly for clogging.

Clean and reinstall or replace the air supply tubing assembly (para. 4-20).

Step 7. Inspect the air supply valve for clogging.

Clean or replace the air supply valve (para. 4-21) and retest the helmet assembly flow P (para. 2-8).

Step 8. Check air supply diffuser for clogs.

Clean or replace air supply diffuser (para. 4-22).

Step 9. Check air supply valve.

Remove the handle valve packing gland nut and valve stem. Inspect the valve stem and valve seat for damage. Reinstall or replace the valve assembly or valve stem as required (para. 4-21).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

8. REDUCED AIR FLOW (Cont)

Step 10. Supply valve loose on stem.

Tighten handle set screws.

Step 11. Listen or feel for air leaking from connections. Check the tightness of connectors.

Tighten the hose connector snugly.

Step 12. Check for loose hose clamps.

Tighten hose clamps.

9. UNABLE TO INCREASE THE AIR FLOW.

Step 1. Remove the supply valve handle and inspect the packing gland nut for proper tightness.

Tighten the packing gland nut snugly.

Step 2. Remove the supply valve handle and stem assembly. Inspect for foreign matter and valve stem damage.

Clean and reassemble the valve. Replace the valve or damaged stem (para. 4-21).

10. EXCESSIVE OR UNCONTROLLABLE FLOW.

Step 1. Inspect the supply tubing connections for improperly installed or defective tail-piece preformed packing. Check for improperly tightened tail-piece nuts and connectors.

a. Correctly reinstall the preformed packing. Replace if damaged (para. 4-20).

b. Perform leak check of the supply tubing assembly (para. 2-8).

Step 2. Check for loose packing gland nut or stripped threads.

Remove the supply valve handle and tighten the packing gland nut snugly. Check to ensure air flow can be reduced. Replace if necessary (para. 4-21).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

10. EXCESSIVE OR UNCONTROLLABLE FLOW (Cont).

Step 3. Remove the supply valve handle and valve stem. Inspect for foreign matter between valve stem and valve seat.

Clean the valve assembly and check the air supply system for further fouling. Determine source of the fouling material. Ensure air flow can be reduced.

Step 4. Inspect valve stem for damage.

Replace valve stem (para. 4-21).

11. IMPROPER HELMET P.

Step 1. Attempt to operate the poppet valve with chin button.

Clean and lubricate the poppet shaft and mounting hole. Replace the poppet valve or the exhaust valve body if necessary (para. 4-23 or 4-24). Reassemble and perform helmet flow and P test (para. 2-8).

Step 2. Remove the poppet valve assembly and inspect the valve shaft and its mounting hole for dirt or corrosion.

Clean and lubricate the poppet shaft and mounting hole. Replace the poppet valve or the exhaust valve body if necessary (para. 4-23 or 4-24). Reassemble and perform helmet flow and P test (para. 2-8).

Step 3. Inspect the exhaust valve diffuser for dirt, salt encrustation, and oil.

Replace or clean and reinstall the diffuser (para. 4-23 or 4-24). Perform helmet flow and P test (para. 2-8).

Step 4. Check exhaust valve for proper operating range by performing helmet flow and P test (para. 2-8).

Replace the exhaust valve spring (para. 4-23 or 4-24) and readjust the exhaust valve during retest (para. 2-8).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

12. LEAK IN VIEWPORT ASSEMBLY.

Step 1. Inspect viewport mounting screws for tightness.

Tighten loose screws.

Step 2. Visually inspect the viewport for cracks or chips.

Notify your supervisor of any defects found.

13. LEAK IN ADAPTER ASSEMBLY.

Step 1. Visually inspect the suspect air supply adapter.

Replace the defective preformed packing (para. 4-19) and leak test the adapter.

Step 2. Visually inspect the suspect preformed packing or gasket.

Replace the defective preformed packing or gasket (para. 4-19).

Step 3. Inspect the suspect adapter for properly installed preformed packing and body properly secured to form a seal with the base.

Replace the preformed packing if loose (para. 4-19).

Step 4. Inspect for loose or missing screws.

Replace if missing, tighten if loose.

14. LEAK AT SUPPLY VALVE MOUNTING.

Step 1. Inspect the preformed packing for cuts, nicks or deterioration.

Replace the preformed packing (para 4-21).

Step 2. Remove the supply valve and visually inspect the penetrator-to-shell seal.

Remove the penetrator and clean away the old sealant (para. 4-21).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

15. LEAK AT EXHAUST VALVE.

    Step 1. Visually inspect the exhaust valve body preformed packing.

        Replace preformed packing (para. 4-23 or 4-24).

    Step 2. Inspect valve mounting screws for proper installation.

        Tighten or replace screws.

    Step 3. Visually inspect the diaphragm and retainer.

        Replace the diaphragm if required (para. 4-23 or 4-24).

16. LEAK BETWEEN THE BASE AND UPPER BREECH RING.

    Step 1. Visually inspect the base-to-breech ring preformed packing.

        Replace the defective preformed packing (para. 4-18).

    Step 2. Inspect the breech ring mounting screws for tightness and damage.

        Tighten and replace as necessary.

17. LEAK BETWEEN SHELL AND BASE.

    Step 1. Inspect shell and base for signs of deterioration.

        Deliver to advanced repair facility.

    Step 2. Inspect the shell-to-base screws and inserts for tightness and proper thread seal.

        Tighten and reseal as necessary.

18. RELIEF VALVE WILL NOT LIFT.

    Step 1. Substitute a new relief valve.

        Replace relief valve and retest (para. 4-21).

    Step 2. Retest for relieving pressure.

        Adjust to lift at 20 psig and retest (para. 2-8).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
19. RELIEF VALVE WILL NOT RESEAT.
Step 1. Check for foreign matter.
Clean and retest.
Step 2. Substitute new valve.
Replace and retest (para. 4-21).
Step 3. Adjust valve to proper relieving pressure.
Adjust as necessary and retest (para. 2-8).

SECTION V. UNIT MAINTENANCE PROCEDURES

4-11. **General.** This section contains MK12 Surface Supported Diving System (SSDS) maintenance procedures which are the responsibility of the operator/unit maintenance as authorized by the MAC and Source, Maintenance, and Recoverability (SMR) coded items. Maintenance procedures will be presented step-by-step in the order in which the work is logically performed. Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Chapter 4, Section VII of this manual.

4-12. **Diver's Coveralls.**

This task covers: Repair

INITIAL SETUP:

Tools	*Materials/Parts*
Shears (Item 48, Appendix B)	Repair Kit

Repair. (figure 4-1)

NOTE

Spare weight pocket assemblies and patches for knee and elbow are provided in repair kit.

(1) Remove old pockets (1) and/or patches (2).

(2) Sew new pockets (1) and/or patches (2) into place.

(3) Repair weak seams by resewing.

NOTE

Reinforcement may be required.

(4) Pull tears together, overlap sides, and sew.

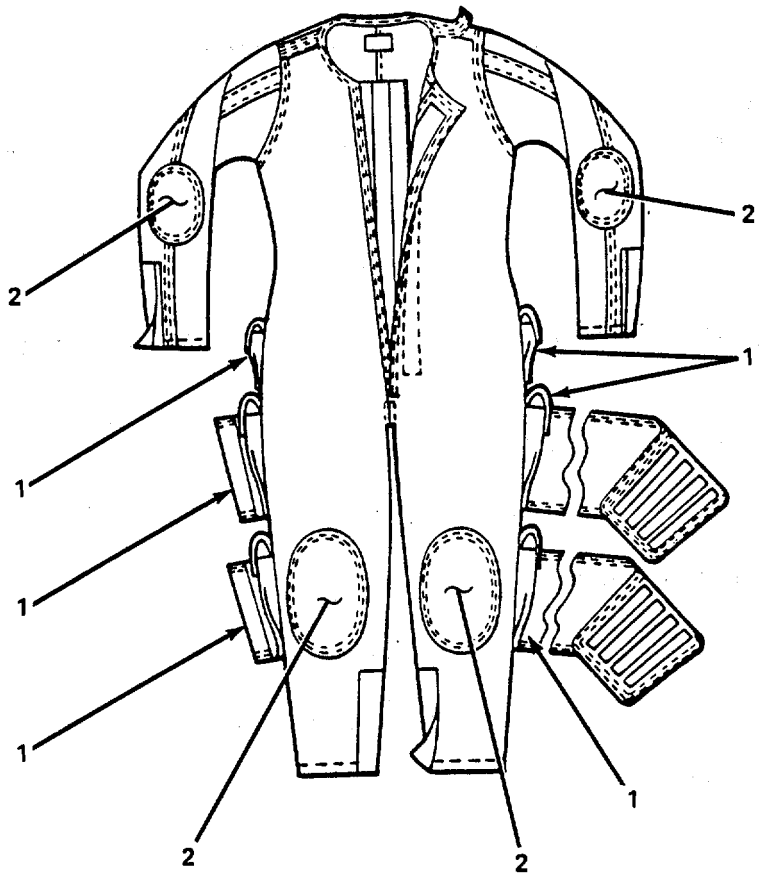


Figure 4-1. Outer Garment, Repair

4-13. **Diver's Drysuit.**

This task covers: Repair

INITIAL SETUP

Tools

Shears (Item 48, Appendix B)
Roller (Item 49, Appendix B)
Iron (Item 59, Appendix B)

Materials/Parts

Halocarbon grease 25-55 (Item 10, Appendix E)
Marker, tailors soap (Item 17, Appendix E)
Glue (Item 9, Appendix E)
Razor Blade (Item 15, Appendix E)
Repair Kit

Repair.

(1) *Seams*. (figure 4-2)

CAUTION
Do not cut through inner seal tape.

(a) Slice open seam with razor blade, almost to the tape and about 3/4-inch on each side of the leak.

(b) Open seam far enough to allow for proper gluing.

CAUTION
Make certain the surfaces involved are clean, dry, and free from grease or oil.

(c) The first coat (pregluing) should be relatively thick. It should be applied to both surfaces and should completely cover neoprene foam.

NOTE
A good preglue coat should appear shiny when dry. Allow to dry thoroughly (at least 10 minutes).

(d) Apply second coat and ensure that it completely covers the first coat.

(e) Allow glue to become tacky.

(f) Press seam together with fingers.

(g) Use nylon-split stripping and follow gluing instructions.

(h) Preglue suit three times and the exposed cell side of the stripping once.

(i) When final coat is tacky, apply stripping and press firmly with fingers or roller.

(j) Roll edge of nylon-split onto the surface of the suit.

(2) *Puncture or tear*. (figure 4-2).

(a) If puncture or tear is large enough to allow regluing, do so and reinforce as if it were a seam (para. 4-13(1)).

(b) If puncture or tear is too small, cut with a razor blade and treat as a seam (para. 4-13(1)).

(c) If some neoprene materials has been removed, an insert panel is required.

1 Cut out around damaged material.

2 Make a copy of the shape removed.

NOTE

Ensure the fit to be correct.

3 Glue and reinforce seam.

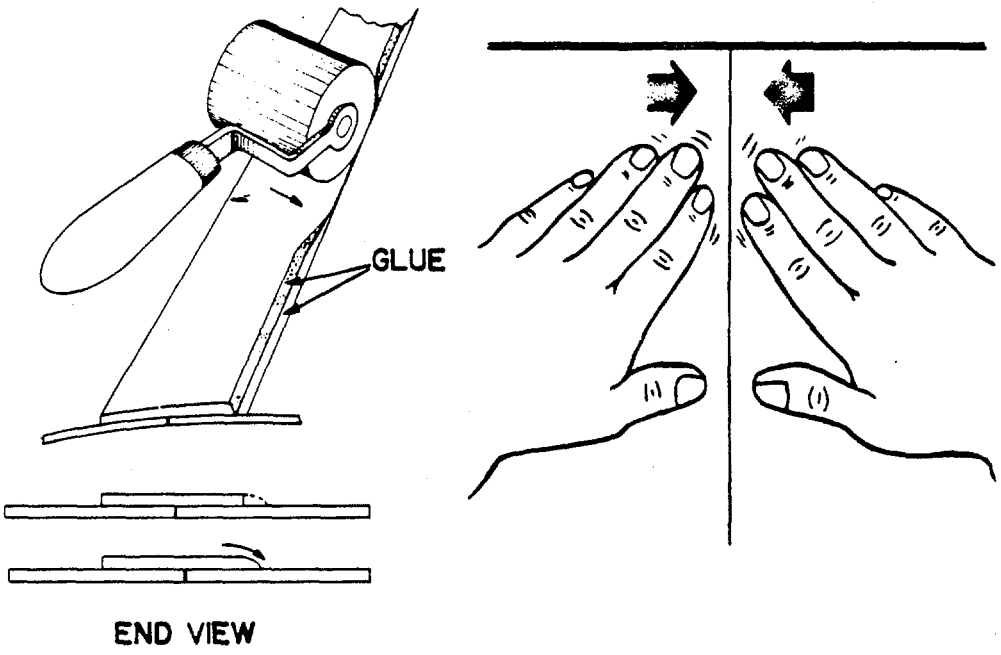


Figure 4-2. Seam, Repair.

4-13. **Drysuit (Cont).**

(3) *Abrasion*. (figure 4-3).

(a) Nylon-split material is required as a pad and glued to the nylon surface when abrasions are repaired.

(b) To retain the stretch of the material, glue outer edge of patch and put three dots of glue in center.

(c) Abrasion occurring on cuffs can best be repaired by replacement.

1 Make a copy of removed cuff or use a cuff from spare parts.

2 Glue and reinforce seam

(4) *Neckpiece*.

(a) Remove seal tape and cut off old neckpiece.

(b) Glue new neckpiece onto drysuit and reinforce seam.

(5) *Zippe*r.

CAUTION

To prevent weakening the tape, do not heat any section of tape that is not to be removed.

Do not scorch the suit.

(a) Use a standard hand iron set at midrange to heat the tape.

(b) While tape is still hot, peel away from drysuit.

(c) Cut out old zipper panel.

(d) Mark center of new panel and midpoints of drysuit behind it.

(e) Glue zipper panel into place beginning with midpoints, upper and lower.

(f) Glue rounded corners.

(g) Glue remainder of seam.

(h) Turn suit inside out, check seam and touch up as necessary.

(i) Apply stripping and reinforce seam.

CAUTION

Be certain to inspect and lubricate new zipper teeth.

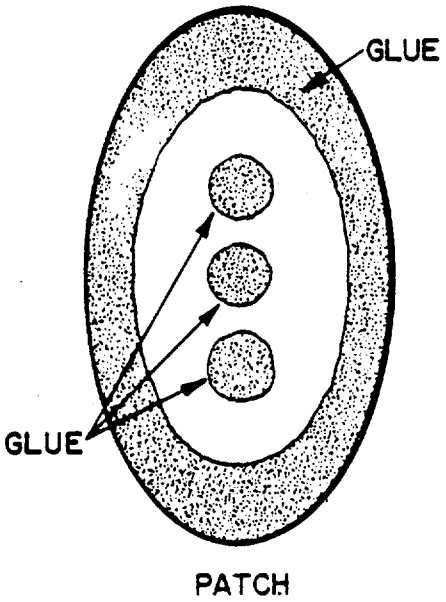


Figure 4-3. Abrasion, Repair.

4-14. **Boots.**

This task covers Repair

INITIAL SETUP

Tools	*Materials/Parts*
Shears (Item 48, Appendix B)	Razor Blade (Item 15, Appendix E) Spare Parts

Repair.

(1) *Replace straps.* (figure 4-4)

(a) Cut strap (1) off immediately behind frayed part or broken end.

(b) Cut a length of strap (1) from provided spares equal to the length removed plus one inch.

(c) Overlap straps one inch, with new strap on top.

(d) Box stitch straps (seven to nine stitches per inch).

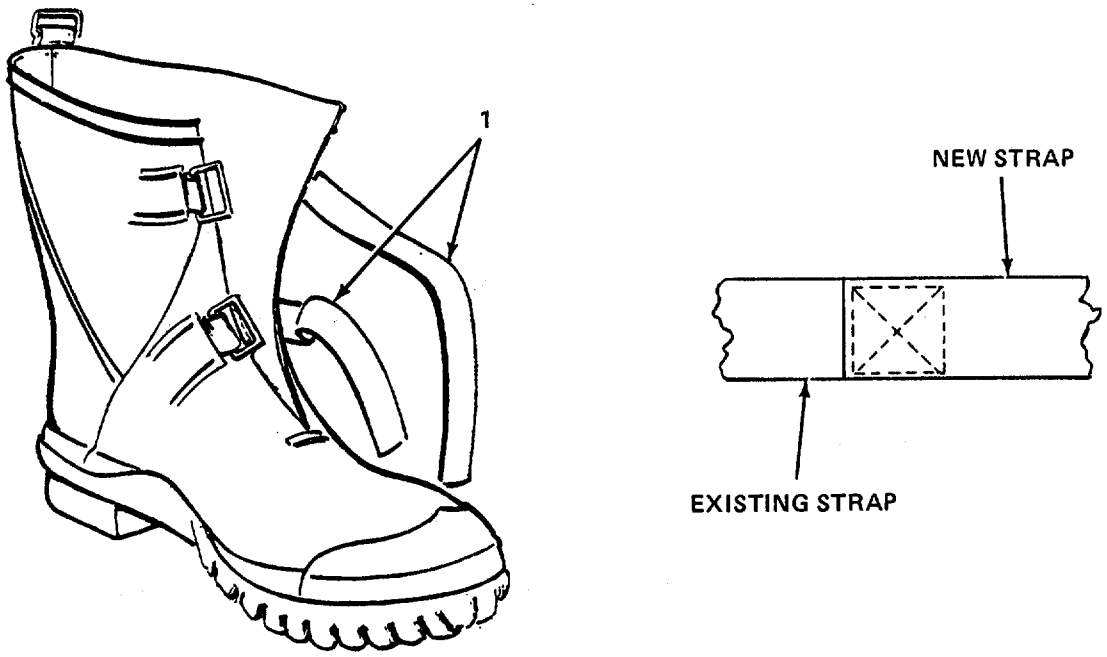


Figure 4-4. Straps, Repair.

4-14. **Boots (Cont).**

(2) *Replace loop*. (figure 4-5)

CAUTION

Do not cut through the boot.

(a) Remove old loop (1) and strap (2) from boot (3).

(b) Cut a length of strap equal to length of strap removed.

(c) Fold strap (2) around one side of loop (1) and sew.

(d) Sew strap (2) and loop (1) into place using box stitch (7 to 9 stitches per inch).

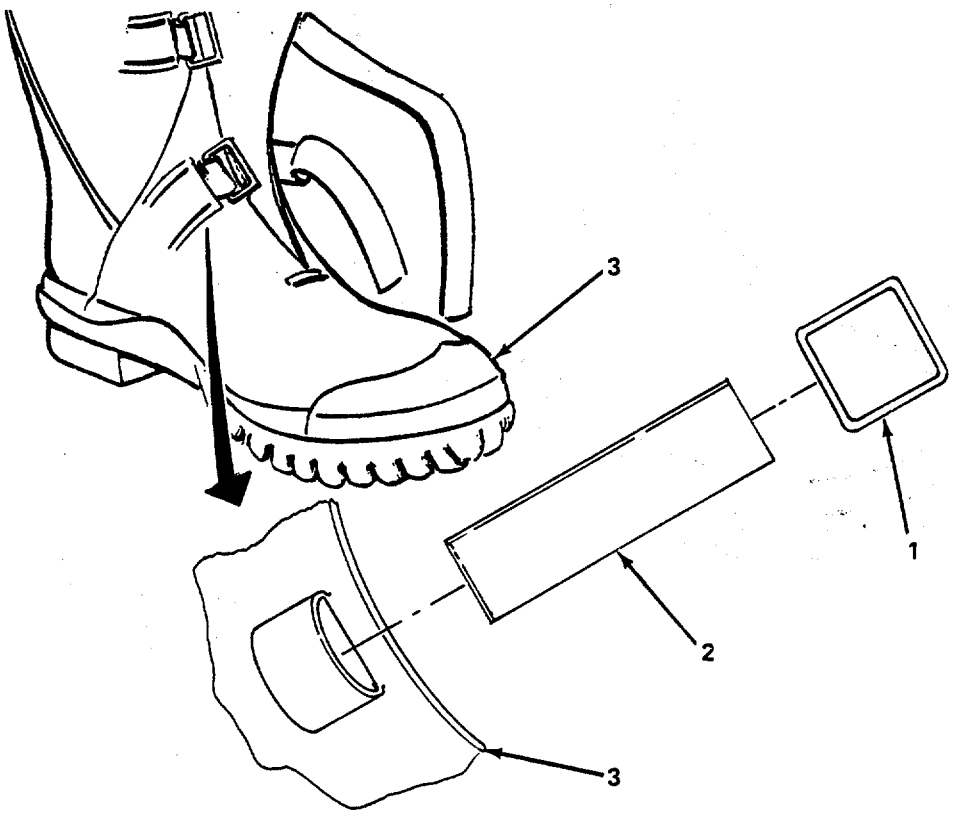


Figure 4-5. Loop, Repair.

(3) *Replace buckle.* (figure 4-6)

(a) Remove loop (1) from boot (2).

(b) Remove strap (3) from buckle (4).

(c) Remove strap (3) from boot (2) and remove buckle (4).

(d) Install new buckle (4) on strap (3) and sew strap (3) to boot (2) with a box stitch (7 to 9 stitches per inch).

(e) Install loop (1) on buckle (4) and sew loop (1) to boot (2) with box stitch (7 to 9 stitches per inch).

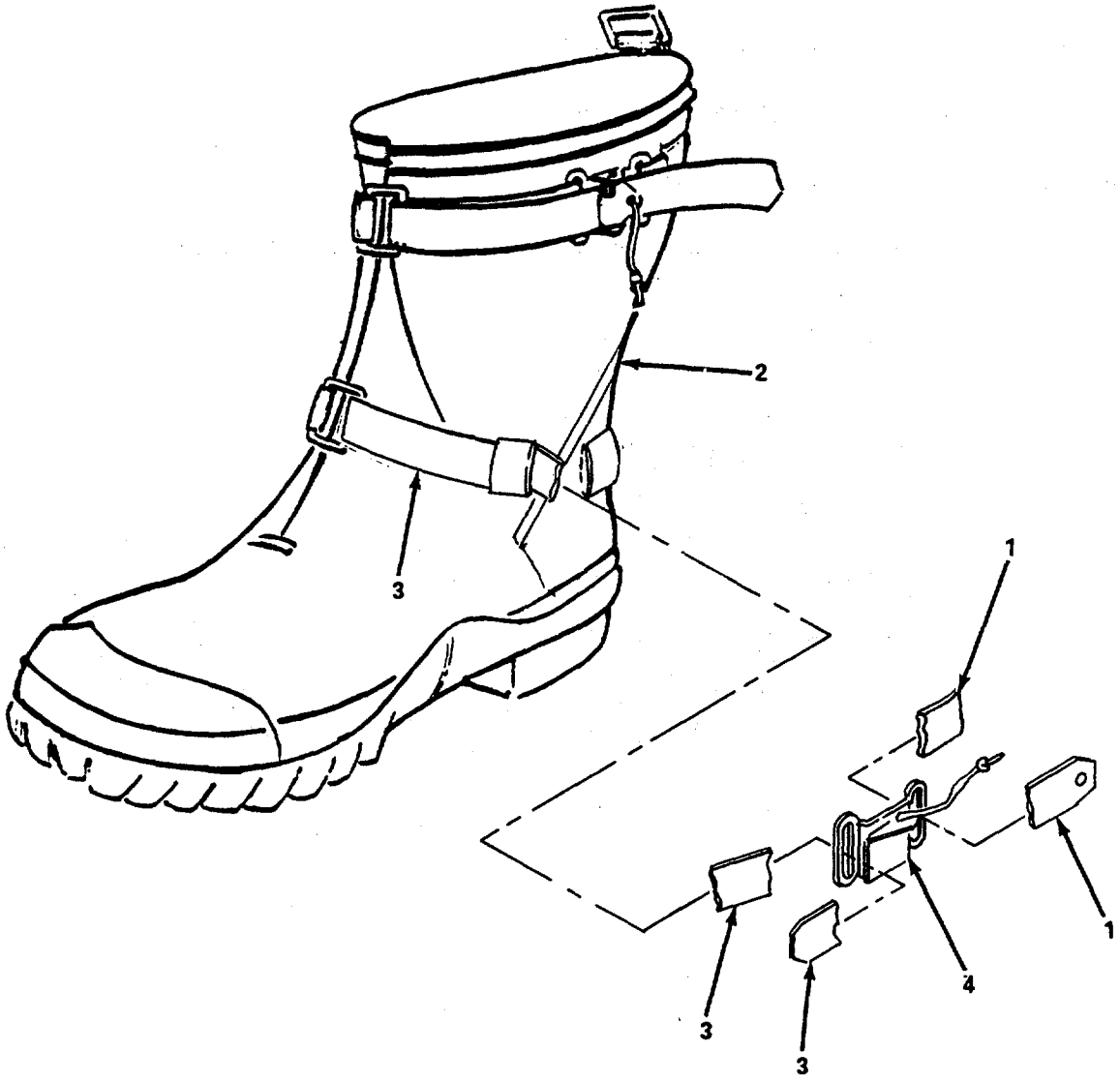


Figure 4-6. Buckle, Repair.

4-15. **Diver's Mittens**.

This task covers: Repair

INITIAL SETUP

Tools

Shears (Item 48, Appendix B)
Roller (Item 49, Appendix B)
Iron (Item 59, Appendix B)

Materials/Parts

Razor Blade (Item 15, Appendix E)
Glue (Item 9, Appendix E)

Repair. (figure 4-7)

CAUTION

Do not cut completely through glove.

(1) Slice open glove (1) with razor blade about 3/4-inch on both sides of puncture.

(2) Open slice far enough to allow gluing.

CAUTION

Make certain the surfaces involved are clean, dry, and free of grease or oil.

(3) Apply a thick coating to both surfaces and completely cover neoprene foam.

CAUTION

A good preglue coat should appear shiny when dry. Allow to dry thoroughly (at least 10 minutes).

(4) Apply a second coat and ensure it completely covers the first coat

(5) Allow glue to become tacky.

(6) Press seams together with fingers.

(7) Use nylon-split stripping (2) and follow gluing instructions.

(8) Preglue glove three times and the exposed all side of stripping once.

(9) When final coat is tacky, apply stripping and press firmly with fingers or roller.

(10) Roll edge of nylon-split onto the surface of the suit.

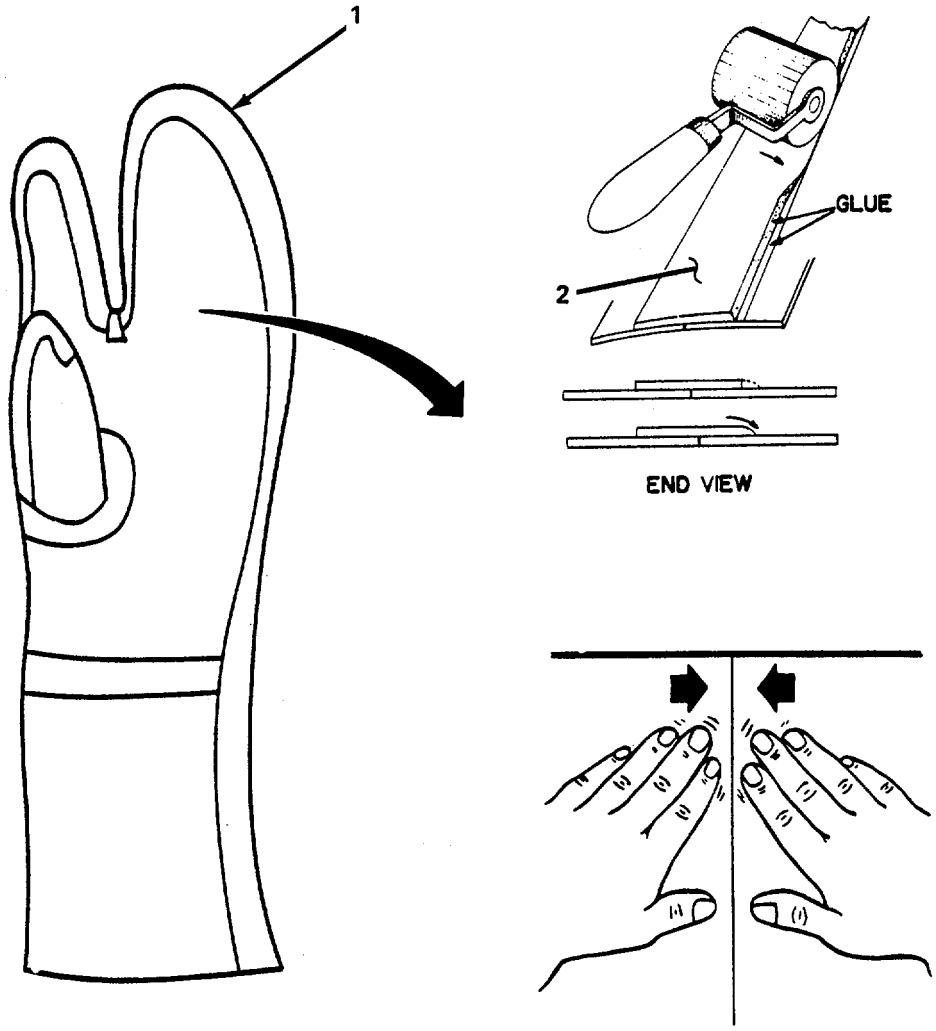


Figure 4-7. Diver's Mitten, Repair.

4-16. **Diver's Harness**.

This task covers: Repair

INITIAL SETUP

Tools	*Materials/Parts*
Shears (Item 48, Appendix B)	Repair Kit

Repair.

(1) *Replace straps*. (figure 4-8)

(a) Cut stitching on worn strap (1) and remove.

(b) Stitch new strap (1) into place after cutting to length plus enough to fold over prior to stitching.

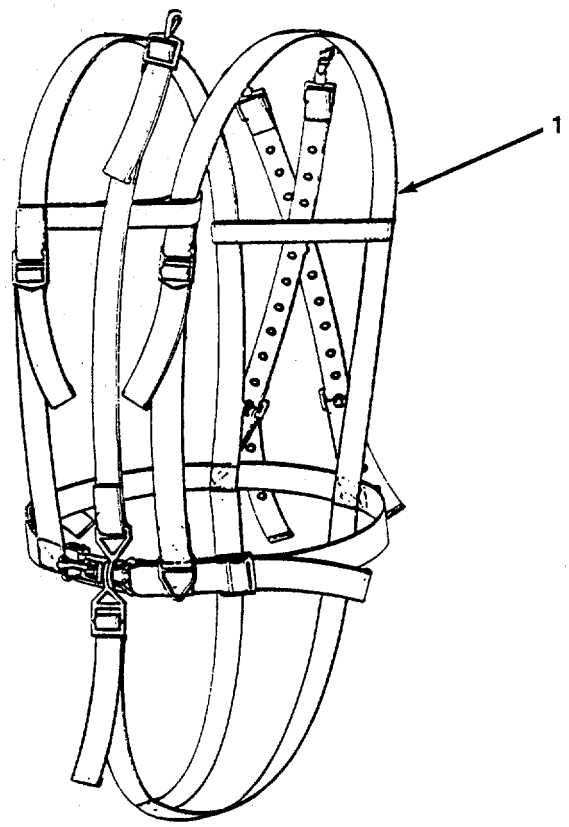


Figure 4-8. Straps, Replace.

(2) *Replace hardware*. (figure 4-9)

CAUTION

Do not cut the strap.

(a) Remove hardware (1) from harness (2) by cutting strap stitching.

(b) Put new hardware (1) into place and stitch securely.

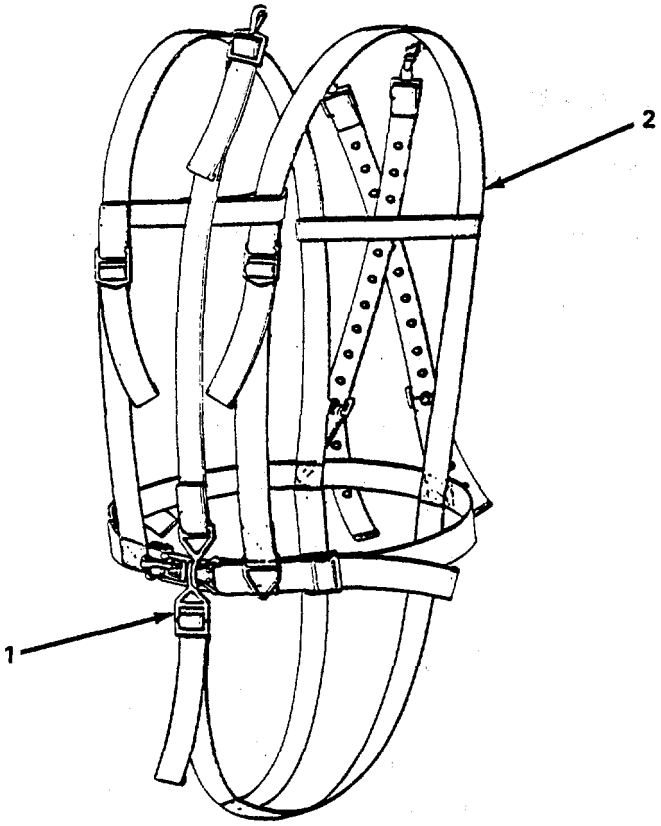


Figure 4-9. Hardware, Replace.

4-17. **Helmet Base Breech Ring**.

This task covers Replace

INITIAL SETUP

Tools

5/64-inch, Hex Wrench (Item 17, Appendix B)
Wrench, Torque (Item 14, Appendix B)
MK12 Test Set (Item 44, Appendix B)
Adapter, Socket Wrench (Item 41, Appendix B)
Insert, Hex (Item 51, Appendix B)

Materials/Parts

RTV Sealant (Item 1, Appendix E)
Halocarbon Grease (Item 10, Appendix E)
Spare Parts Kit
Helmet Breech Ring

Replace. (figure 4-10)

(1) Remove preformed packing (1).

(2) Remove 10 screws (2) and remove helmet breech ring (3) and preformed packing (4), which is discarded.

(3) Lightly lubricate new preformed packing (4).

(4) Install preformed packing (4) and breech ring (3) and secure with 10 screws (2) finger tight.

(5) Torque screws (2) to 18-20 in.-lb (1.7-2.3 Nm) using a staggered sequence.

(6) Lightly lubricate preformed packing (1) and install.

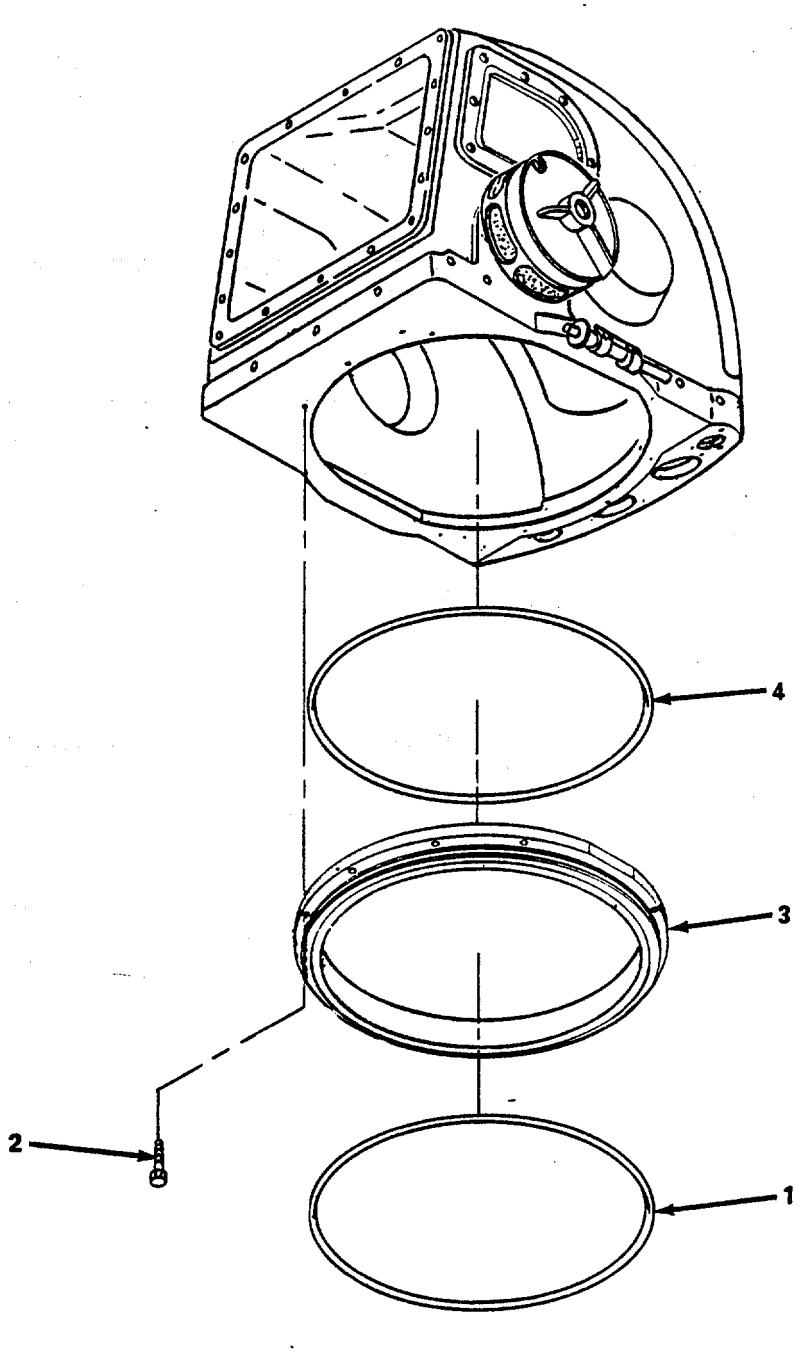


Figure 4-10. Helmet Base Breech Ring, Replace.

4-18. **Lower Breech Ring Assembly**.

This task covers: Replace

INITIAL SETUP

Tools

3/32-inch Hex Wrench (Item 19, Appendix B)
Wrench, Torque (Item 14, Appendix B)
Adapter, Socket Wrench (Item 41, Appendix B)
Insert, Hex (Item 55, Appendix B)

Materials/Parts

RTV Sealant (Item 1, Appendix E)
Halocarbon Grease (Item 10, Appendix E)
Lower Breech Ring

Replace. (figure 4-11)

(1) Remove two hex screws (1) and remove lug (2)

(2) Remove two hex screws (3) and remove lug (4).

(3) Remove six hex screws (5) and remove jocking harness brackets (6). Note location of bracketsfor reassembly.

(4) Remove 14 hex screws (7) and remove lower breech ring (8) and lower breech ring retainer (9) from neckdam (10) (or drysuit).

(5) Install lower breech ring retainer (9) on neckdam (10) (or drysuit). Ensure neckdam seam is at rear center.

(6) Install new lower breech ring (8) on neckdam (10) (or drysuit) and secure with 14 hex screws (7) finger tight. Apply light film of adhesive sealant.

(7) Install jocking harness brackets (6) and secure with six hex screws (5).

(8) Install lower lug (4) and secure with two hex screws (3).

(9) Install lower lug (2) and secure with two hex screws (1).

(10) Torque all screws to 18-20 in.-lb (1.7-2.3 Nm) using a staggered sequence.

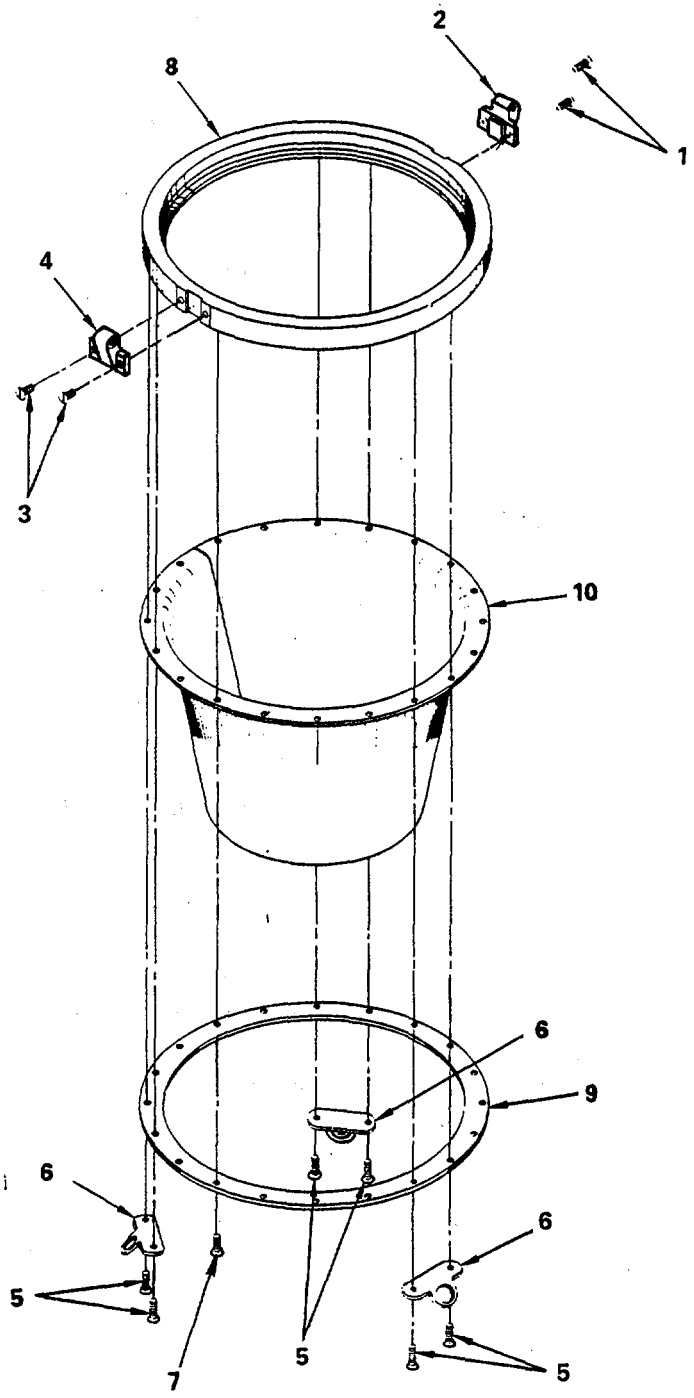


Figure 4-11. Lower Breech Ring Assembly, Replace.

4-19. **Air Supply Adapter**.

This task covers: Replace

INITIAL SETUP

Tools

Pliers, Inside Snap Ring (Item 45, Appendix B)
9/64-inch Hex Wrench (Item 22, Appendix B)
3/4-inch Box and Open End Wrench (Item 40, Appendix B)
13/16 -inch Box and Open End Wrench (Item 8, Appendix B)
0-50 in.-lbs Torque Wrench (Item 14, Appendix B)
Insert, Hex (Item 51, Appendix B)
MK12 Test Set (Item 44, Appendix B)

Materials/Parts

RTV Sealant (Item 1, Appendix E)
Halocarbon Grease (Item 10, Appendix E)
Talcum Powder (Item 19, Appendix E)

Reference

Para. 4-11, General

Replace. (figure 4-12)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Remove air supply adapter cap (1) and gasket (2).

(2) Remove helmet liner (3).

(3) Loosen the tubing connector nut (4) at the air adapter (5).

(4) Remove the three screws (6) and remove the air supply adapter (5), preformed packing (7), and preformed packing (8).

(5) Remove connector (9) and preformed packing (10).

(6) Remove retaining ring (11), filter screw (12), one way valve (13), and preformed packing (14).

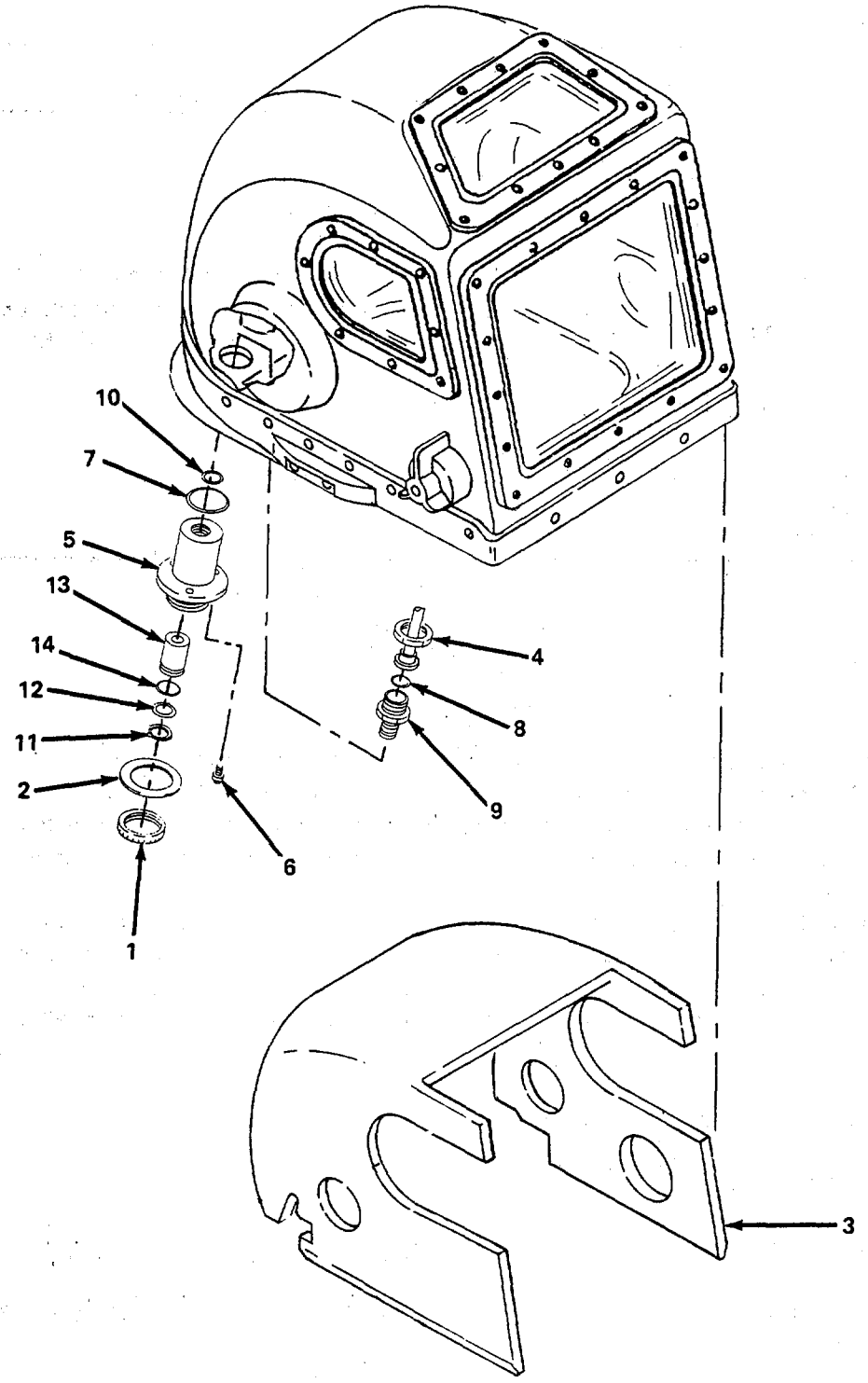


Figure 4-12. Air Supply Adapter Assembly, Replace.

NOTE

Use only enough lubricant to coat item(s) without excess.

(7) Apply a light film of lubricant to new preformed packings (10) and (8).

(8) Install new preformed packings (10) and (8) and install connector (9) in air supply adapter (5) and tighten.

(9) Apply a light film of lubricant to new preformed packing (7).

(10) Install new preformed packing (7) and air supply adapter (5) and align three screw holes.

(11) Apply a thin film of adhesive sealant to screws (6) and thread screws into place.

(12) Tighten screws evenly and torque to 15-20 in.-lb (1.7-2.3 Nm).

(13) Apply a light film of lubricant to new preformed packing (14).

CAUTION

Ensure the flow arrow is pointing into helmet.

(14) Install new preformed packing (14) and one way valve (13) fully into the bore of air supply adapter (5).

(15) Install filter screen (12), smooth side up, with cupped side down against one way valve (13) and secure with retainer ring (11).

(16) Apply talc to cap gasket (2) and install into cap (1). Ensure the gasket lies flat and fits properly into place.

(17) Install adapter cap (1) and tighten by hand.

NOTE

Take care not to dislodge connector face seal preformed packing.

(18) Align tubing connector nut (4) with connector (9) and tighten snugly.

(19) Install helmet liner (3).

4-20. **Air Supply Tube**.

This task covers: Replace

INITIAL SETUP

Tools

3/4-inch Box and Open End Wrench (Item 40, Appendix B)
13/16 -inch Box and Open End Wrench (Item 8, Appendix B)
MK12 Test Set (Item 44, Appendix B)

Materials/Parts

Halocarbon Grease 25-53 (Item 10, Appendix E)
Air Supply Tube
Tie Wraps

Reference

Para. 4-11 General

Replace. (figure 4-13)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

CAUTION

Shield the front viewport inner surface with cardboard or other material to avoid marring or scratching.

(1) Remove helmet liner (1).

(2) Remove plastic tie wraps binding air supply tubing (2) and microphone wiring lead (3).

(3) Remove microphone (4) from air supply tubing (2).

NOTE

If tubing will not clear the adapter and supply valve, loosen supply valve nut until the valve is movable.

(4) Loosen two connector nuts (5) and remove air supply tubing (2) and two preformed packings (6).

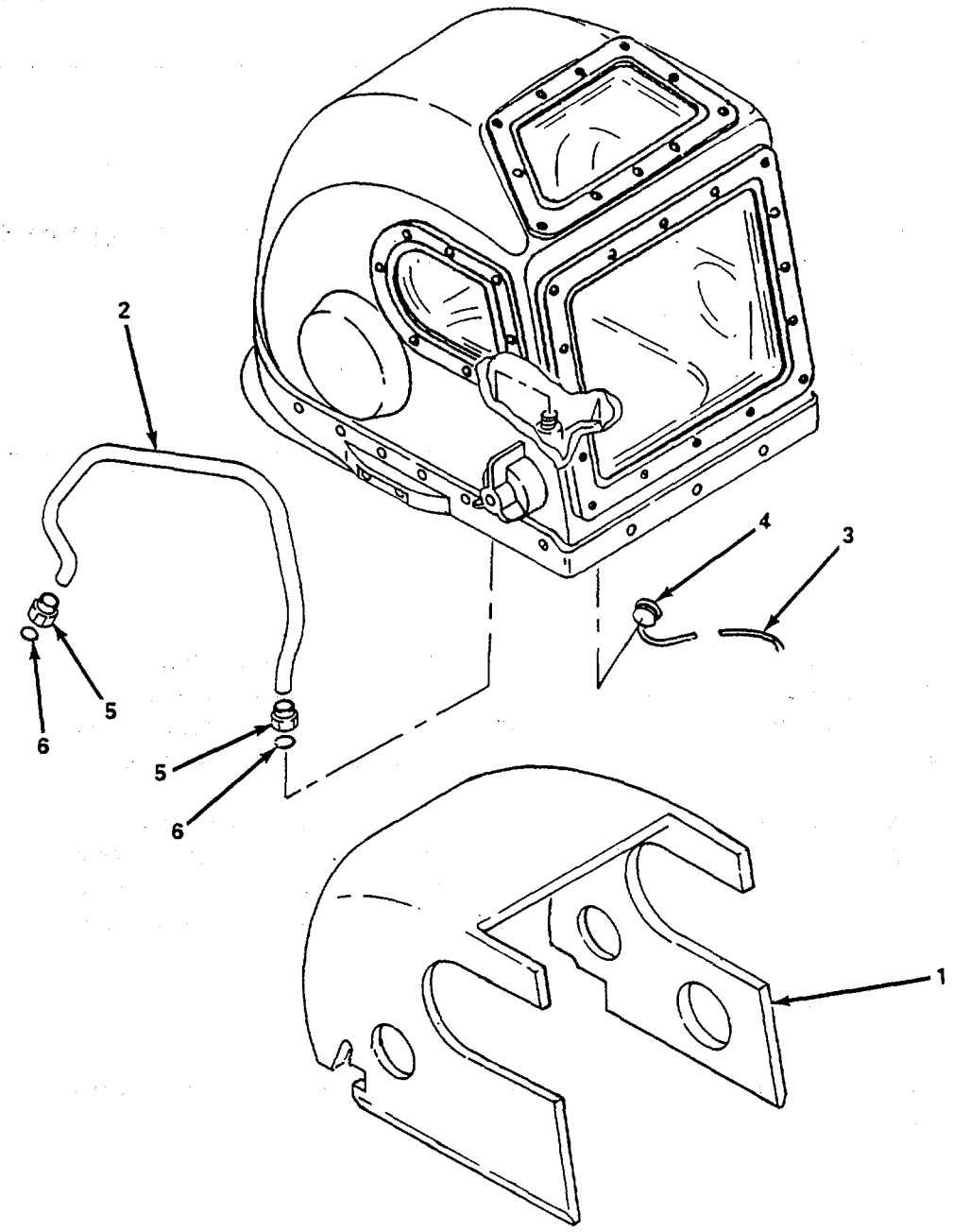


Figure 4-13. Air Supply Tube, Replace.

NOTE

Use only enough lubricant to coat item(s) without excess.

Take care not to damage helmet wiring during installation.

(5) Apply light film of lubricant to new preformed packings (6) and install.

NOTE

Take care not to dislodge the connector face seal new preformed packings.

(6) Install air supply (2) and tighten two connector nuts (5).

(7) Install microphone (4) on air supply tubing (2). Secure with tie wraps.

(8) Install helmet liner (1).

4-21. **Air Supply Valve**.

This task covers: Replace

INITIAL SETUP

Tools

1-inch Box and Open End Wrench (Item 11, Appendix B)
1 1/4-inch Box and Open End Wrench (Item 13, (Appendix B)
3/32-inch Hex Wrench (Item 19, Appendix B)
7/8-inch Box and Open End Wrench (Item 10, Appendix B)

Materials/Parts

Air Supply Valve
Halocarbon Grease (Item 10, Appendix E)

Equipment Condition

Air supply tubing removed (para. 4-20).

Reference

Para. 4-11 General

Replace. (figure 4-14)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two setscrews (1) and remove handle (2).

(2) Remove gland nut (3).

(3) Remove nut (4) and remove air supply valve (5), preformed packing (6) and diffuser assembly (7). Install nut (4) on gland nut (3) back on air supply valve (5).

(4) Remove diffuser assembly (7) and preformed packing (8).

(5) Remove relief valve (9).

(6) Remove connector (10) and preformed packing (11).

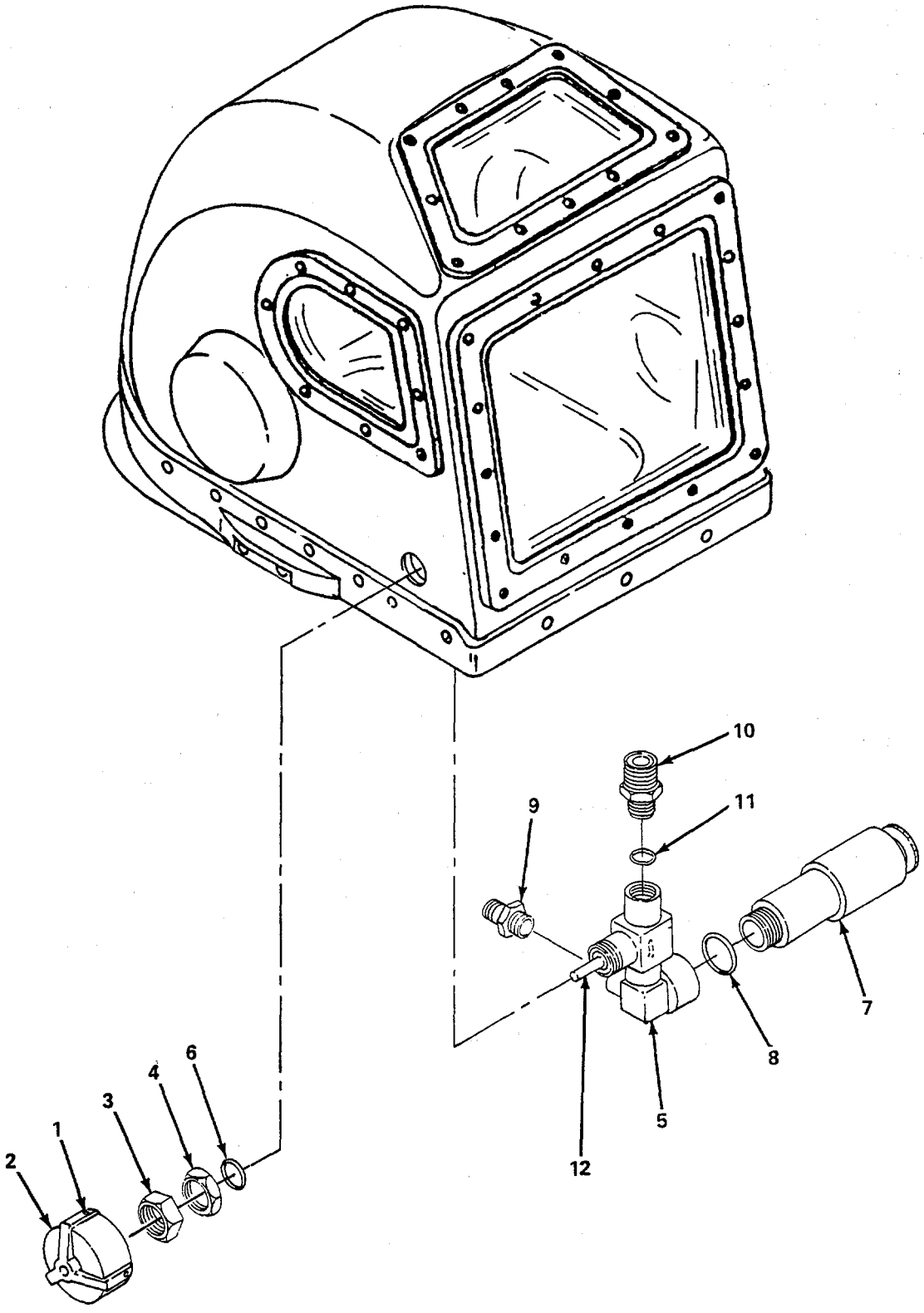


Figure 4-14. Air Supply Valve, Replace.

NOTE

Use only enough lubricant to coat items without excess.

(7) Apply a thin film of lubricant to all new preformed packings.

(8) Install new preformed packing (11) and connector (10).

(9) Install relief valve (9).

(10) Install diffuser assembly (7) and new preformed packing (8).

(11) Install air supply valve (5) and new preformed packing and secure with nut (4).

(12) Install gland nut (3).

(13) Install handle (2). Ensure one of setscrews (1) alines with detent on valve stem (12), and tighten two setscrews (1).

(14) Check valve handle (2) movement, it should be firm but smooth.

FOLLOW-ON MAINTENANCE
Install air supply tube (para. 4-20).

4-22. Diffuser Assembly.

This task covers: Replace

INITIAL SETUP:

Tools

Padded, Curved Jaw Pliers (Item 26, Appendix B)

Reference

Para. 4-11 General

Materials/Parts

Diffuser Assembly
Halocarbon Grease (Item 10, Appendix E)

Replace. (figure 4-15)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Unscrew and remove diffuser assembly (1) and preformed packing (2) from air supply valve (3).

NOTE

Use only enough lubricant to coat preformed packings without excess.

(2) Apply a thin film of lubricant to new preformed packing.

(3) Install new preformed packing (2) and diffuser assembly (1).

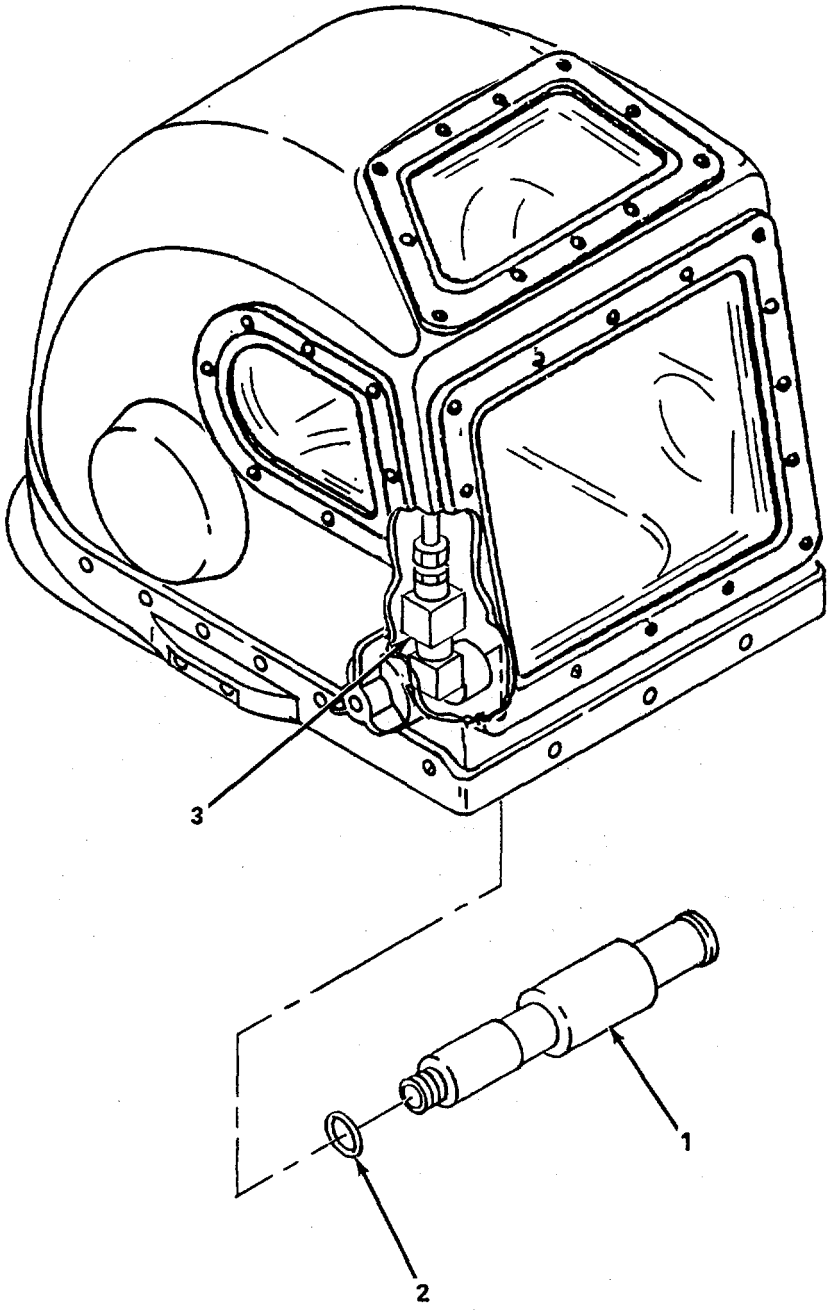


Figure 4-15. Diffuser Assembly, Replace.

4-23. Adjustable Exhaust Valve.

This task covers: a. Replace b. Repair

INITIAL SETUP:

Tools

0-50 in.-lbs Torque Wrench (Item 14, Appendix B)
Socket Wrench Adapter (Item 41, Appendix B)
5/32-inch Hex Wrench (Item 23, Appendix B)
1/4-inch Hex Wrench (Item 25, Appendix B)
Insert, Hex (Item 54, Appendix B)

Materials/Parts

Adjustable Exhaust Valve
Halocarbon Grease (Item 10, Appendix E)

Reference

Para. 4-11 General

a. Replace. (figure 4-16)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Line up cutout in handle (1) with screw (2) and remove screw (2) and lockwasher (3).

(2) Line up cutout in handle (1) with screw (4) and remove bolt (4), lockwasher (5), cover (6) with handle (1) installed and spring (7).

(3) Remove chin button (8).

(4) Remove poppet valve (9) and preformed packing (10).

(5) Remove two screws (11) and washers (12) and remove valve body (13) and preformed packing (14).

NOTE

Use only enough lubricant to coat preformed packings without excess.

(6) Apply a thin film of lubricant to all new preformed packings.

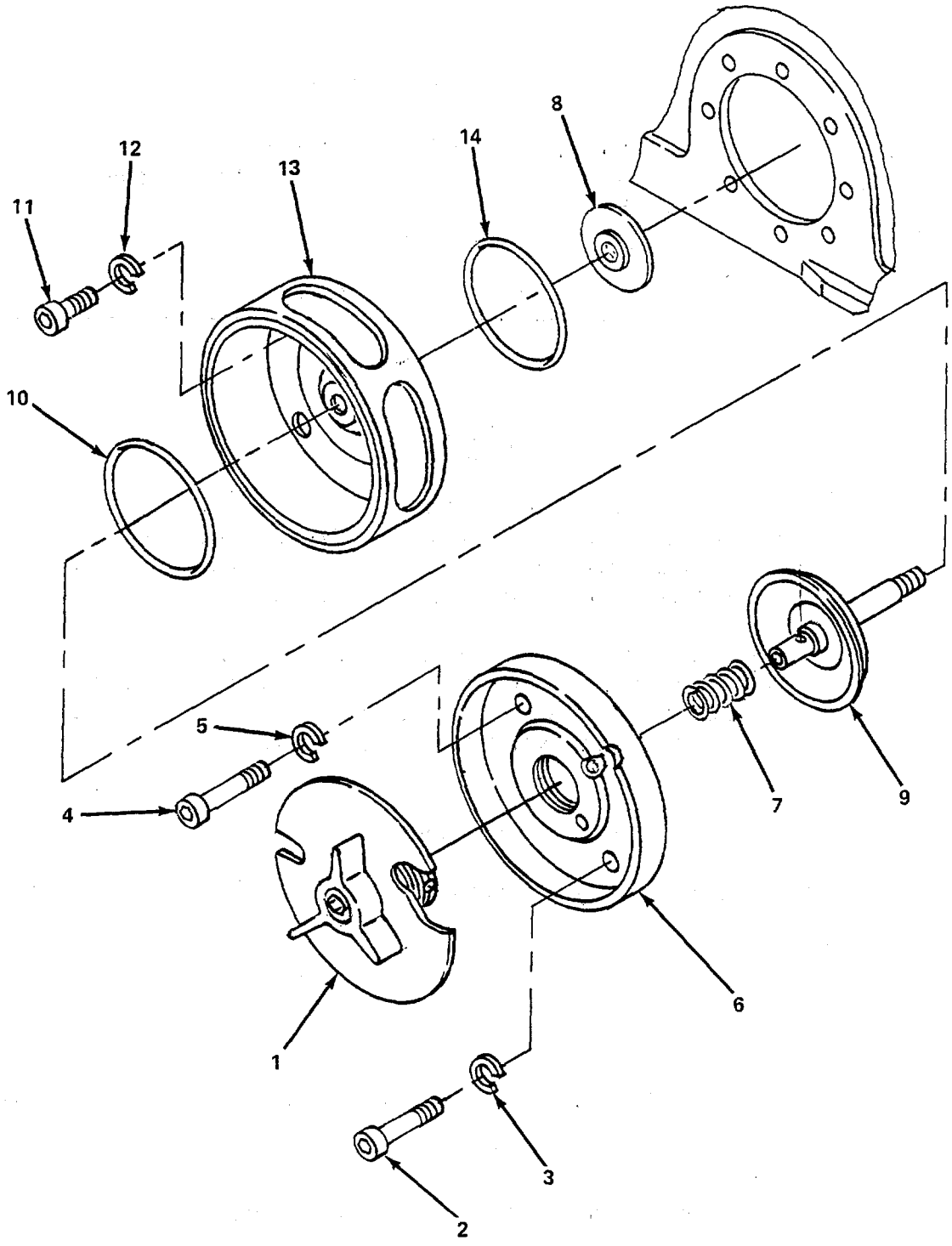


Figure 4-16. Adjustable Exhaust Valve, Replace.

4-23. Adjustable Exhaust Valve (Cont).

(7) Install new preformed packing (14) and valve body (13) and secure with two screws (11) and lockwashers (12). Torque screws to 15-20 in.-lb (1.7-2.3 Nm).

(8) Install new preformed packing (10) and poppet valve (9) and secure with chin button (8).

(9) Install spring (7) and cover (6), with handle (1) installed.

(10) Line up cutout in handle (1) with mounting hardware hole and install screw (4) and lockwasher (5).

(11) Line up cutout in handle (1) with mounting hardware hole and install screw (2) and lockwasher (3).

(12) Torque screws to 15-20 in.-lb (1.7-2.3 Nm).

b. Repair. (figure 4-17)

(1) Remove adjustable exhaust valve (para a.).

(2) Remove diffuser (1) from valve body (2).

(3) Remove diaphragm retainer (3) and diaphragm (4).

(4) Remove straight pin (5) and stop pin (6) from handle (7).

(5) Remove pin (8) and remove valve handle (7) from valve cover (9).

(6) Remove setscrew (10) and friction drag insert (11).

(7) Remove spring tension adjusting screw (12) from handle (7).

(8) Inspect diffuser (1) and replace if torn.

(9) Inspect diaphragm (4) and replace if worn, cracked, or otherwise damaged.

(10) Inspect stop pin (6) and replace if worn or bent.

(11) Inspect handle (7) and replace if cracked, bent, or otherwise damaged.

(12) Inspect valve cover (9) and replace if cracked or bent.

(13) Inspect valve poppet assembly (13) and remove preformed packing (14) and replace if bent, scored, or otherwise damaged.

(14) Inspect spring (15) and replace if cracked, deformed or otherwise damaged.

(15) Replace friction insert (11).

(16) Inspect chin friction (16) and replace if cracked.

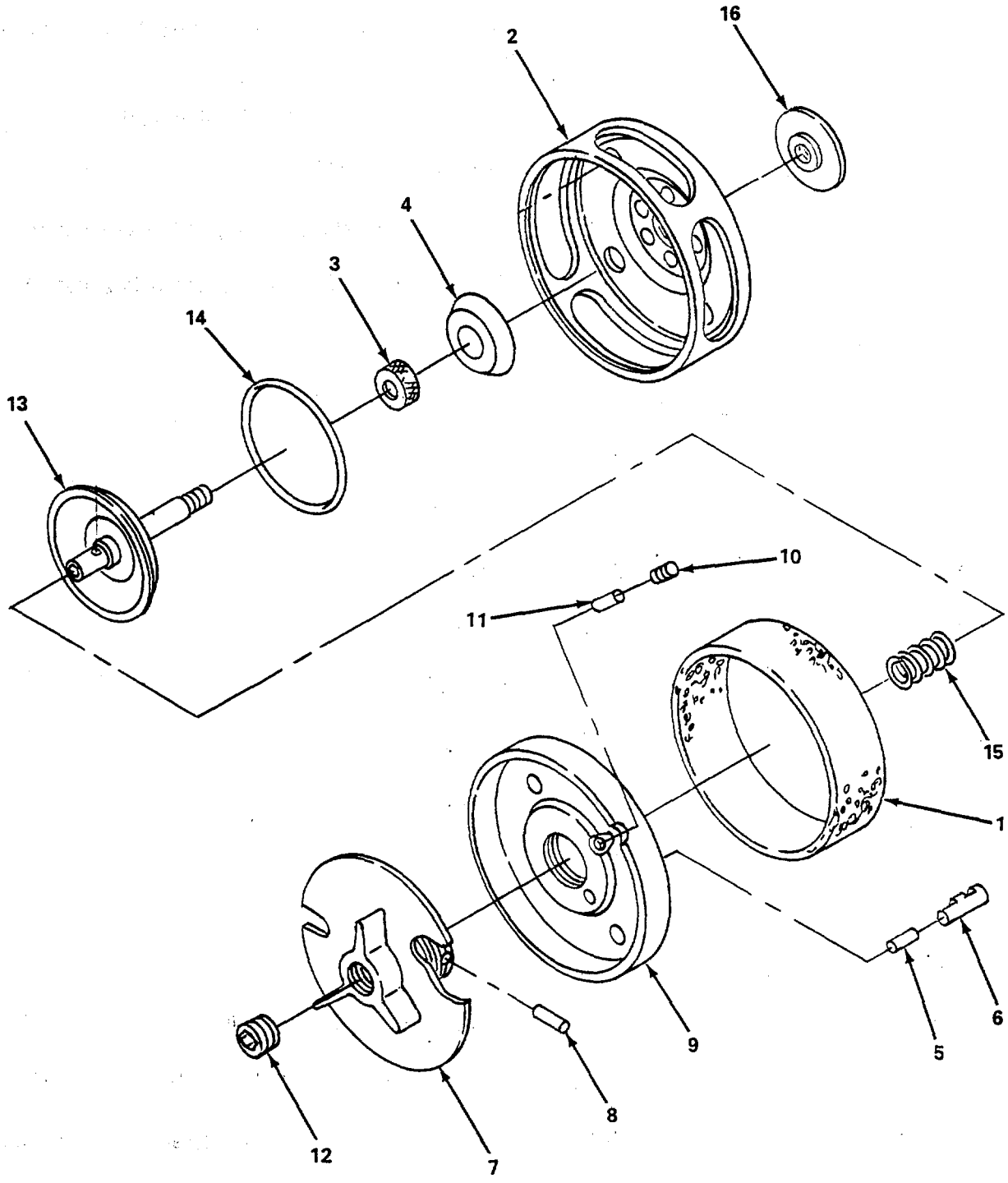


Figure 4-17. Adjustable Exhaust Valve, Repair.

(17) Install spring tension adjusting screw (12) in handle (7).

(18) Install friction drag insert (11)and secure with setscrew (10).

(19) Install handle (7) in valve cover (9) and install pin (8).

(20) Install stop pin (6) and straight pin (5).

(21) Install diaphragm (4) and secure with retainer (3).

(22) Install diffuser (1) in valve body (2).

(23) Install adjustable exhaust valve (para. a.).

4-24. Ambient Exhaust Valve.

This task covers: a. Replace b. Repair

INITIAL SETUP:

Tools

0-50 in.-lbs Torque Wrench (Item 14, Appendix B)
Socket Wrench Adapter (Item 41, Appendix B)
Insert, Hex (Item 54, Appendix B)
5/32-inch Hex Wrench (Item 23, Appendix B)
MK12 Test Set (Item 44, Appendix B)

Materials/Parts

Halocarbon Grease (Item 10, Appendix E)

Reference

Para. 4-11 General

a. Replace. (figure 4-18)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Remove two screws (1) and lockwashers (2) and remove valve cover (3).

(2) Remove two screws (4) and lockwashers (5) and remove valve body (6) and preformed packing (7).

NOTE

Use only enough lubricant to coat preformed packing without excess.

(3) Lightly lubricate valve body new preformed packing (7) and install.

(4) Install valve body (6) and secure with two screws (4) and lockwashers (5). Torque screws to 15-20 lb-in. (1.7-2.3 Nm).

(5) Install ambient valve cover (3) and secure with two screws (1) and lockwashers (2). Torque screws to 15-20 lb-in. (1.7-2.3 Nm).

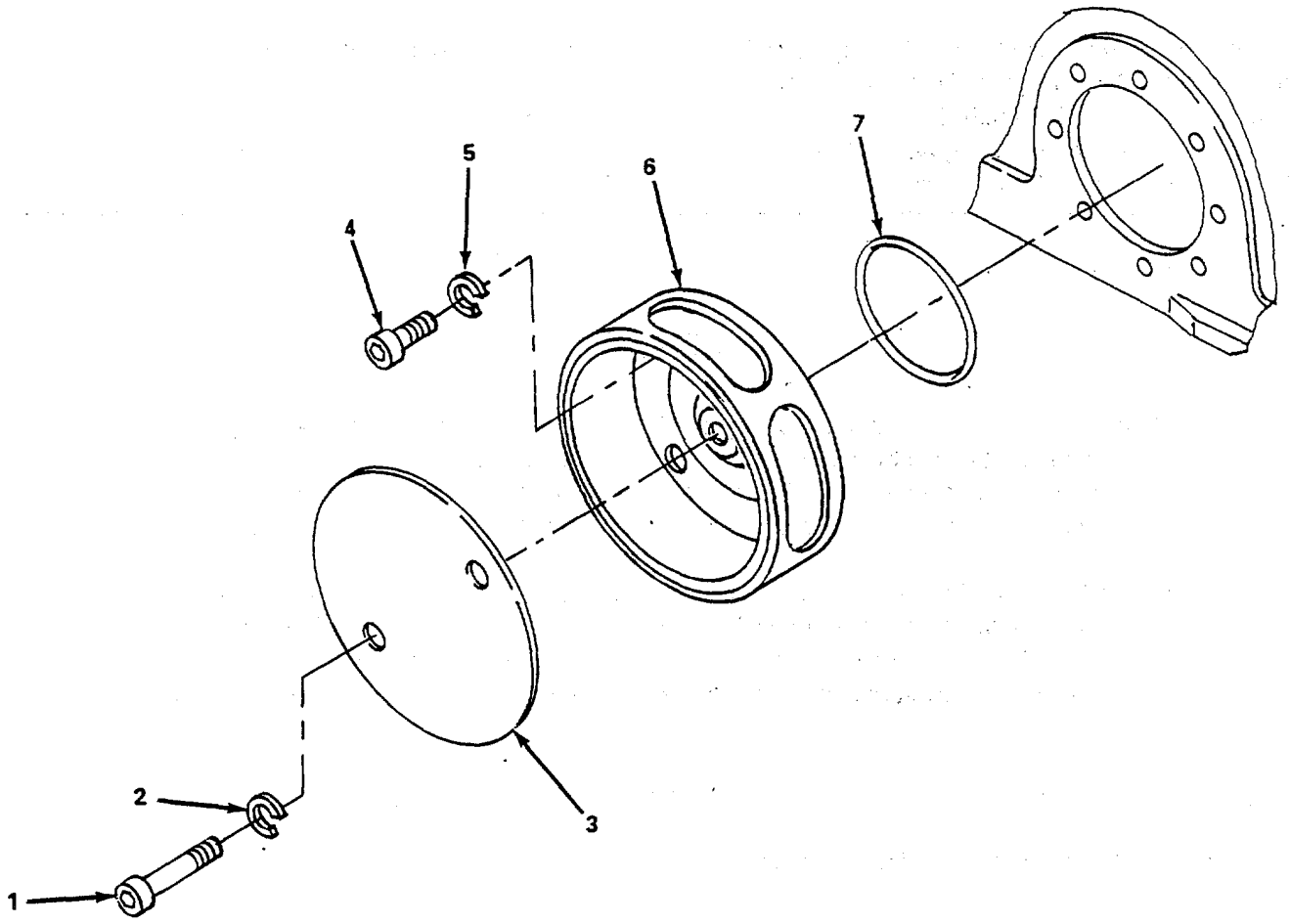


Figure 4-18. Ambient Exhaust Valve, Replace.

4-24. Ambient Exhaust Valve (Cont).

b. Repair. (figure 4-19)

(1) Remove ambient exhaust valve (para. a).

(2) Remove diaphragm retainer (1) and diaphragm (2).

(3) Inspect diaphragm (2) and replace if cracked.

(4) Inspect diffuser (3) and replace if cracked.

(5) Inspect cover (4) and replace if cracked or bent.

(6) Inspect valve body (5) and replace if cracked or bent.

(7) Install diaphragm (2) and secure with retainer (1).

(8) Install ambient exhaust valve (para. a.).

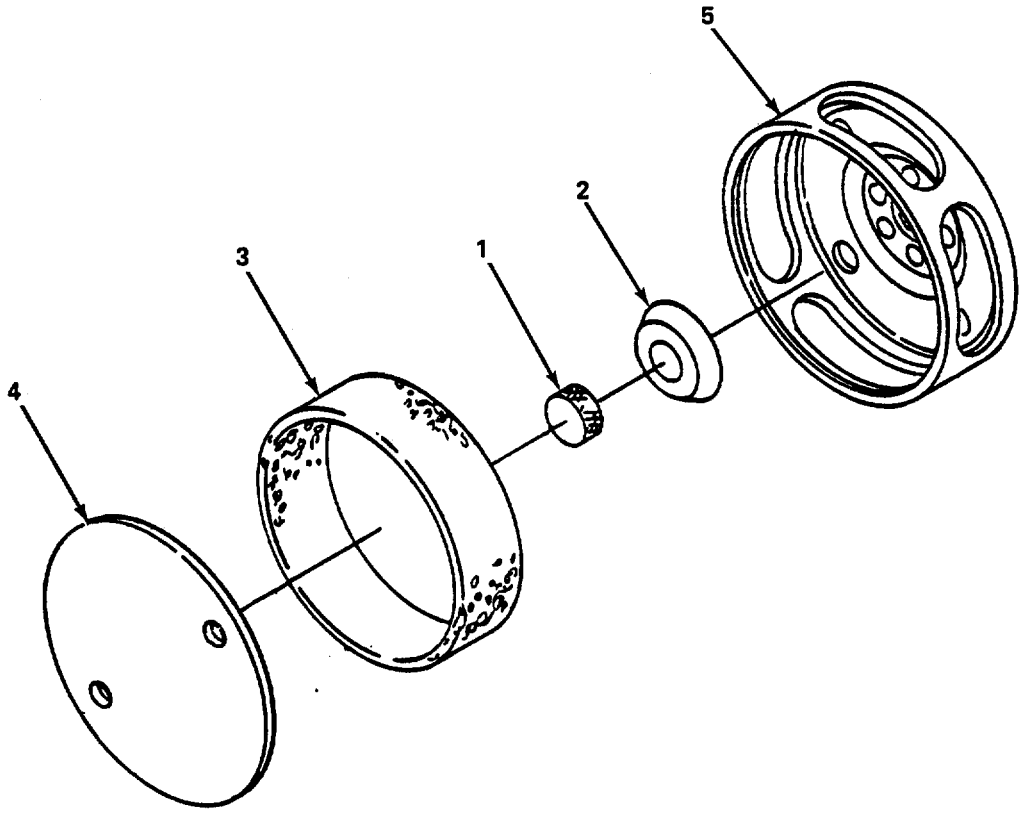


Figure 4-19. Ambient Exhaust Valve, Repair.

4-25. Helmet Lug.

This task covers: a. Replace b. Repair

INITIAL SETUP:

Tools

7/64-inch Hex Wrench (Item 20, Appendix B)
0-50 in.-lb Torque Wrench (Item 14, Appendix B)
3/32-in. Pin Punch (Item 28, Appendix B))
Insert, Hex (Item 56, Appendix B)
Adapter, Socket Wrench (Item 41, Appendix B)

Materials/Parts

RTV Sealant (Item 1, Appendix E)
Halocarbon Grease (Item 10, Appendix E)
Spare Parts Kit

a. Replace. (figure 4-20)

(1) Remove safety pin (1) from helmet lug (2).

(2) Remove roll pin (3) from helmet lug (2) and remove quick-release pin (4).

(3) Remove two screws (5) and helmet lug (2) from helmet base (6).

(4) Apply film of lubricant on helmet lug surface that contact the base.

(5) Apply light film of sealant (RTV) to screws (5).

(6) Install helmet lug (2) on helmet base (6) and secure with two screws (5) finger tight only.

(7) Install lower breech ring assembly (7) to the helmet (8) with the helmet (2) and lower lugs (9) engaged.

(8) Insert quick-release pins (4) and position helmet lug to center the lower lugs (9) and permit free operation of lock pins (4).

(9) Torque helmet lug mounting screws to 8-10 lb-in. (0.9-1.1 Nm).

NOTE

Helmet lugs are drilled at each end to be usable on either side of the helmet. The roll pin must be inserted into the forward hole of each lug.

(10) Orient flat surface of quick-release pins (4) toward helmet base; install roll pin (3).

(11) Install safety pin (1).

CAUTION

Do not tap on lug rings.

(12) Check to ensure free operation of quick-release pins. If it is necessary to reposition a helmet lug, loosen helmet lug mounting screws, reposition lug, and retorque screws.

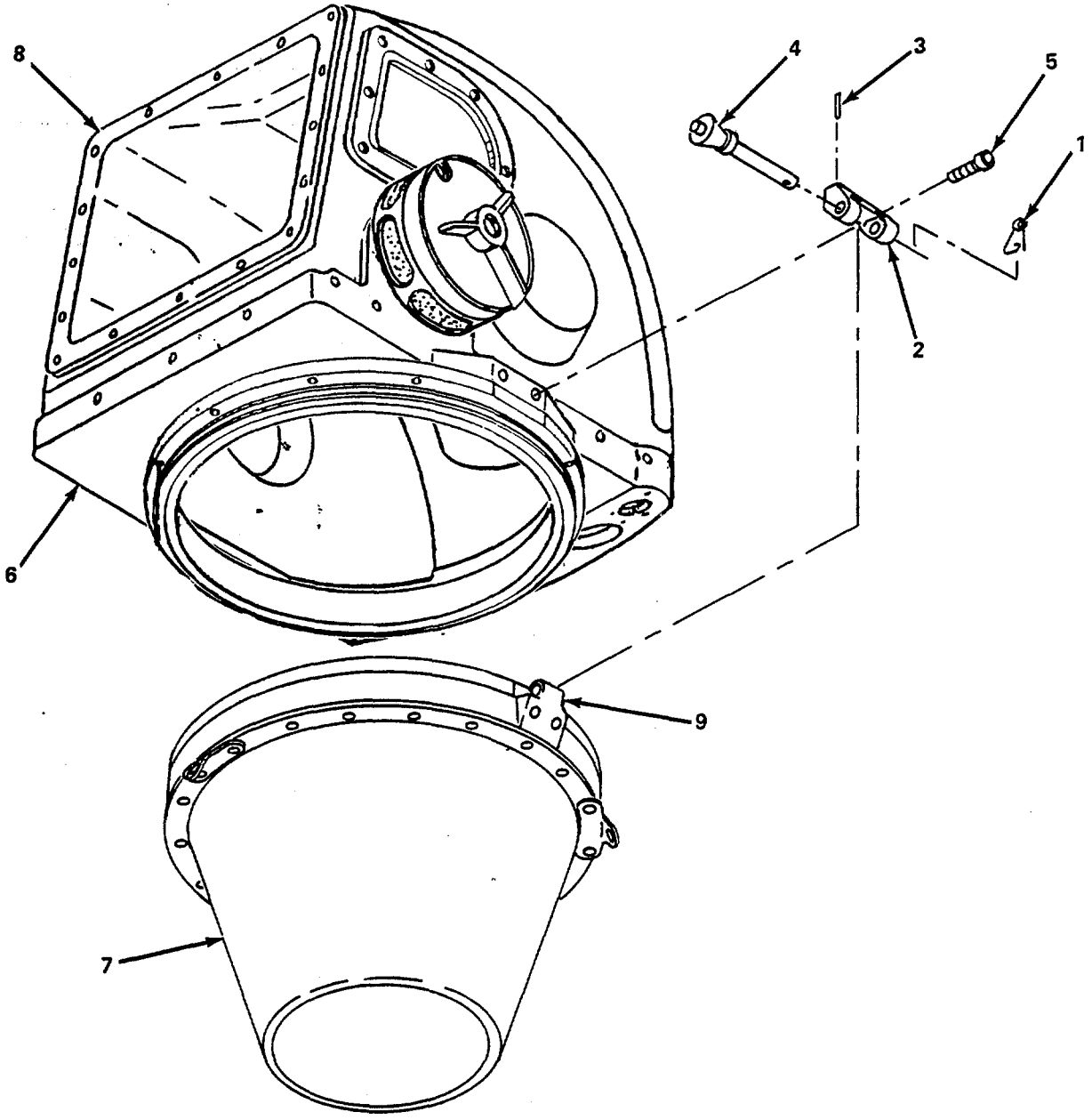


Figure 4-20. Helmet Lug, Replace.

4-25. Helmet Lug (Cont).

b. Repair.

(1) *Replace quick release pin.* (figure 4-21)

(a) Remove safety pin (1).

(b) Remove roll pin (2) and quick release pin (3).

NOTE

Helmet lugs are drilled at each end to be usable on either side of the helmet. The roll pin must be inserted into the forward hole of each lug.

(c) Install quick release pin (3) and secure with roll pin (2).

(d) Install safety pin (1).

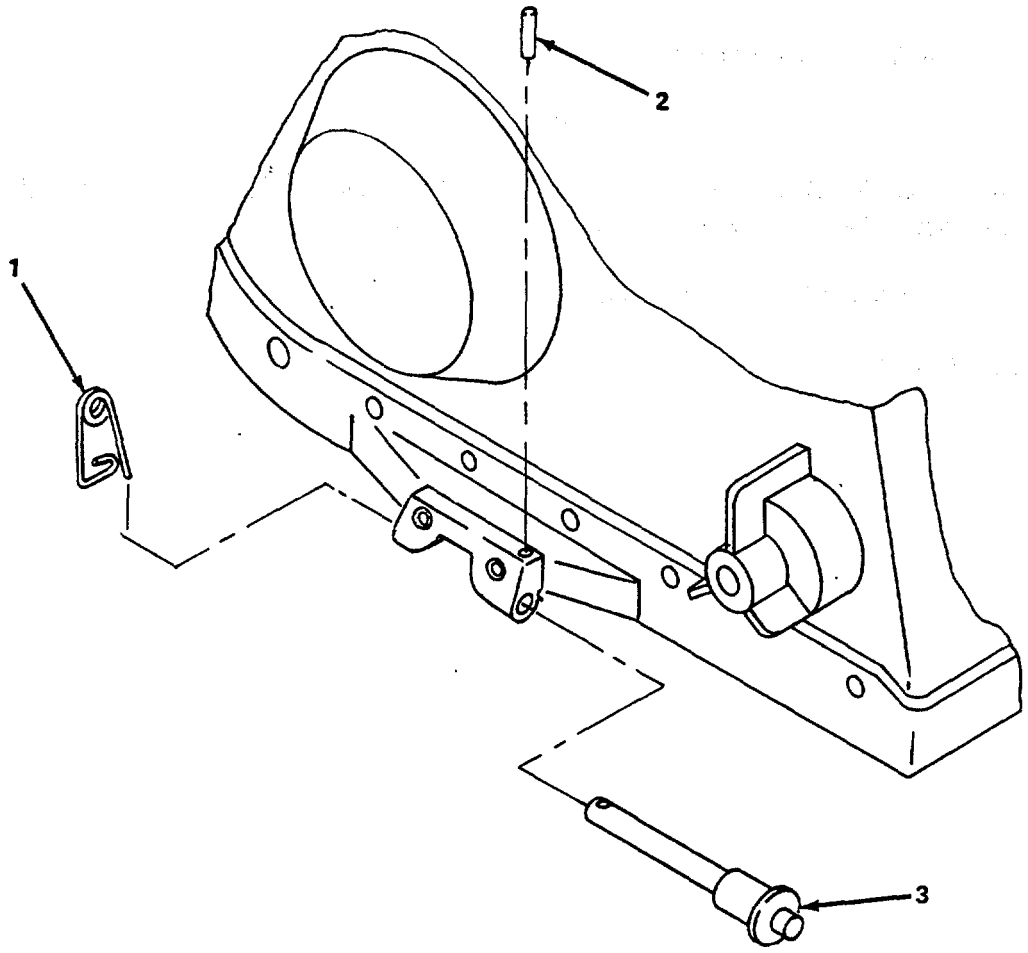


Figure 4-21. Quick Release Pin, Replace.

4-25. Helmet Lug (Cont).

(2) *Replace rollpin*. (figure 4-22)

(a) Remove roll pin (1).

(b) Ensure flat on quick release pin (2) is facing helmet ring (3).

(c) Install roll pin (1).

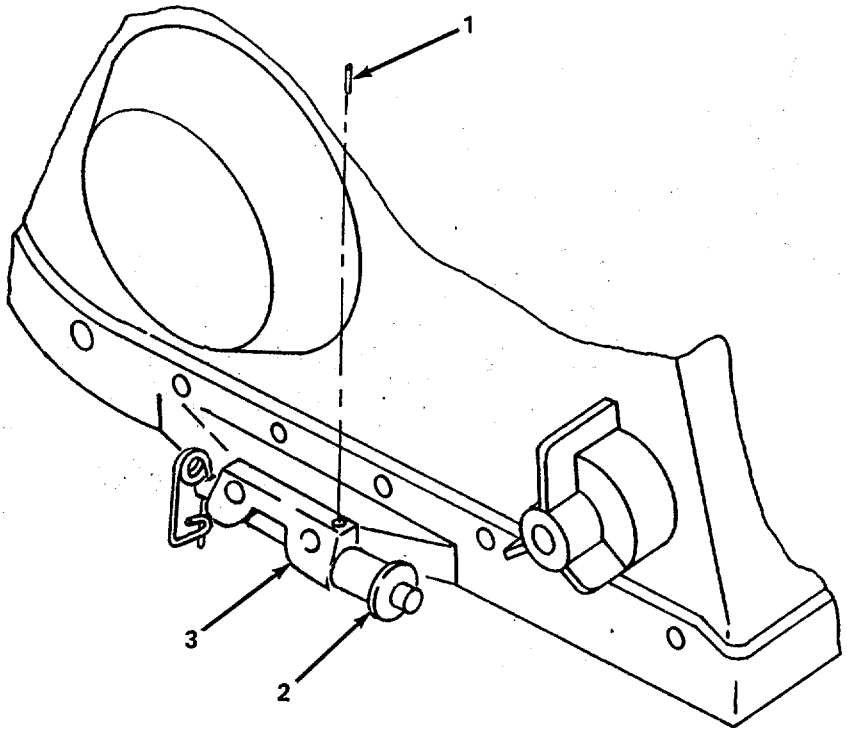


Figure 4-22. Roll Pin, Replace.

(3) *Replace safety pin.* (figure 4-23)

(a) Remove safety pin (1) from quick release pin (2).

(b) Install new safety pin (1) in quick release pin (2).

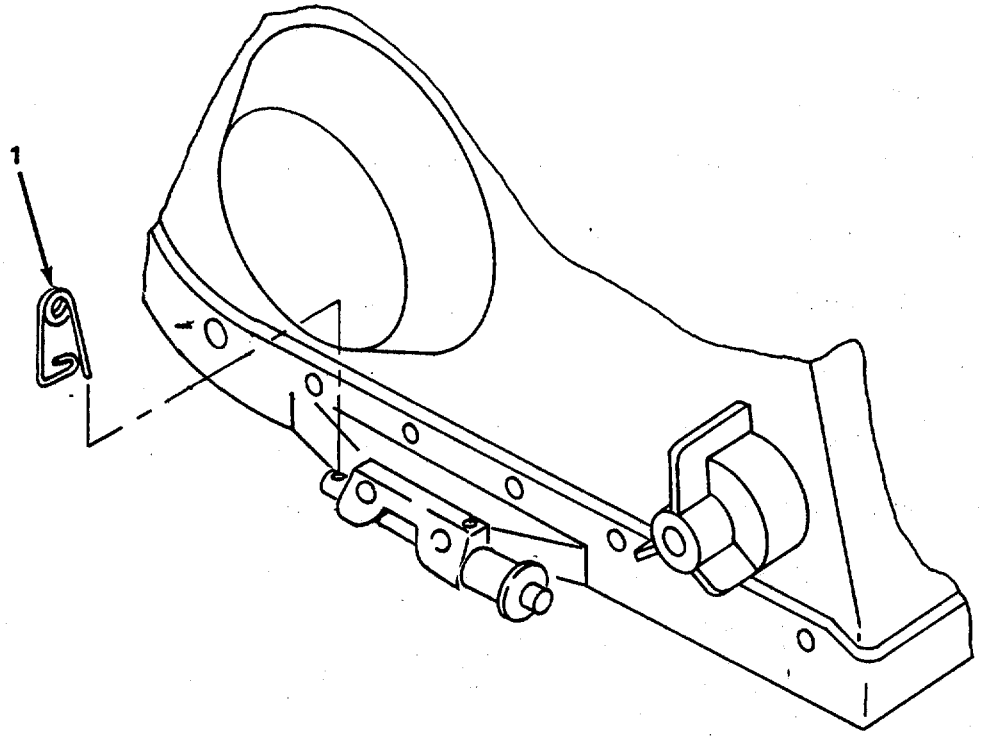


Figure 4-23. Safety Pin, Replace.

4-26. Helmet Communications.

This task covers: a. Test b. Replace c. Repair

INITIAL SETUP:

Tools

Multimeter (Item 52, Appendix B)
Socket Wrench Handle (Item 15, Appendix B)
9/64-inch Hex Wrench (Item 22, Appendix B)
0-50 in.-lb Torque Wrench (Item 14, Appendix B)
Adapter, Socket Wrench (Item 41, Appendix B)
Insert, Hex (Item 51, Appendix B)
Small Screwdriver (Item 29, Appendix B)

Materials/Parts

RTV Sealant (Item 1, Appendix E)
Halocarbon Grease (Item 10, Appendix E)
Nylon Tie Wrap (Item 28, Appendix E)
Clean Cloth (Item 8, Appendix E)
Speakers, Microphone

a. *Test* (figure 4-24)

(1) Perform an end-to-end continuity test on helmet communications assembly.

(2) Replace or repair the helmet communications assembly as required.

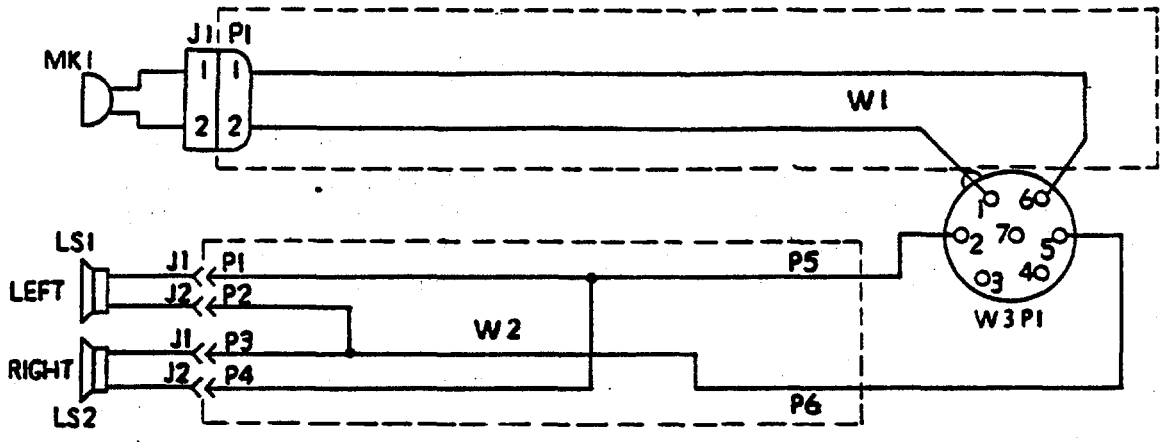


Figure 4-24. Helmet Assembly Schematic.

4-26. Helmet Communications (Cont).

b. Replace.

(1) *Disassemble.* (figure4-25)

(a) Remove helmet liner (1).

(b) Remove microphone (2) and holder (3) from air supply tube (4).

(c) Remove holder (3) from microphone (2).

(d) Loosen two screws (5) and tag and remove leads (6) from microphone (2).

(e) Remove speaker (7) from holder (8).

(f) Loosen two screws (9) and tag and remove leads (10) from speaker (7).

(g) Repeat steps (e) and (f) for other speaker.

(h) Remove three screws (11) and carefully remove communications whip (12) and adapter (13), with leads (6) and (10) and preformed packing (14) from helmet (15).

(i) Unsolder tag and remove leads (6) and (10) from adapter (13).

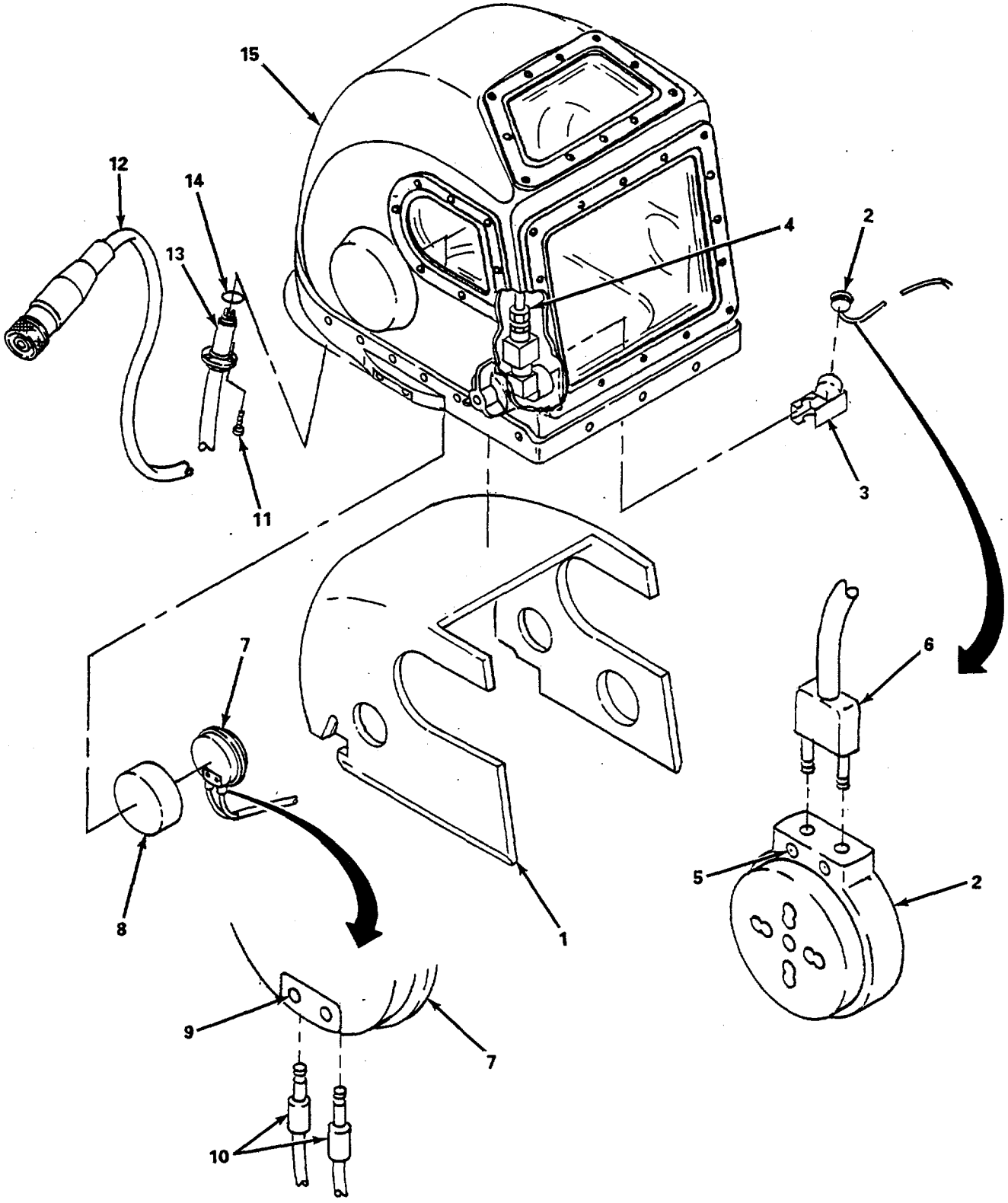


Figure 4-25. Helmet Communications Assembly, Disassemble.

4-26. Helmet Communications (Cont).

(2) *Assemble.* (figure 4-26)

(a) Connect leads (1) and (2) as tagged to adapter (3) and solder.

(b) Route leads (1) and (2) in helmet (4) and install adapter (3) and preformed packing (5) and secure with three screws (6). Torque screws to 13-15 in.-lb. (1.5-1.7 Nm).

(c) Connect leads (1) as tagged to left speaker (7) and tighten two screws (8).

(d) Install speaker (7) in holder (9).

(e) Repeat steps (c) and (d) for remaining speaker.

(f) Connect leads (2) as tagged to microphone (10) and tighten two screws (11).

(g) Install microphone (10) in holder (12).

(h) Connect holder (12) to air supply tube (13).

(i) Install helmet liner (14).

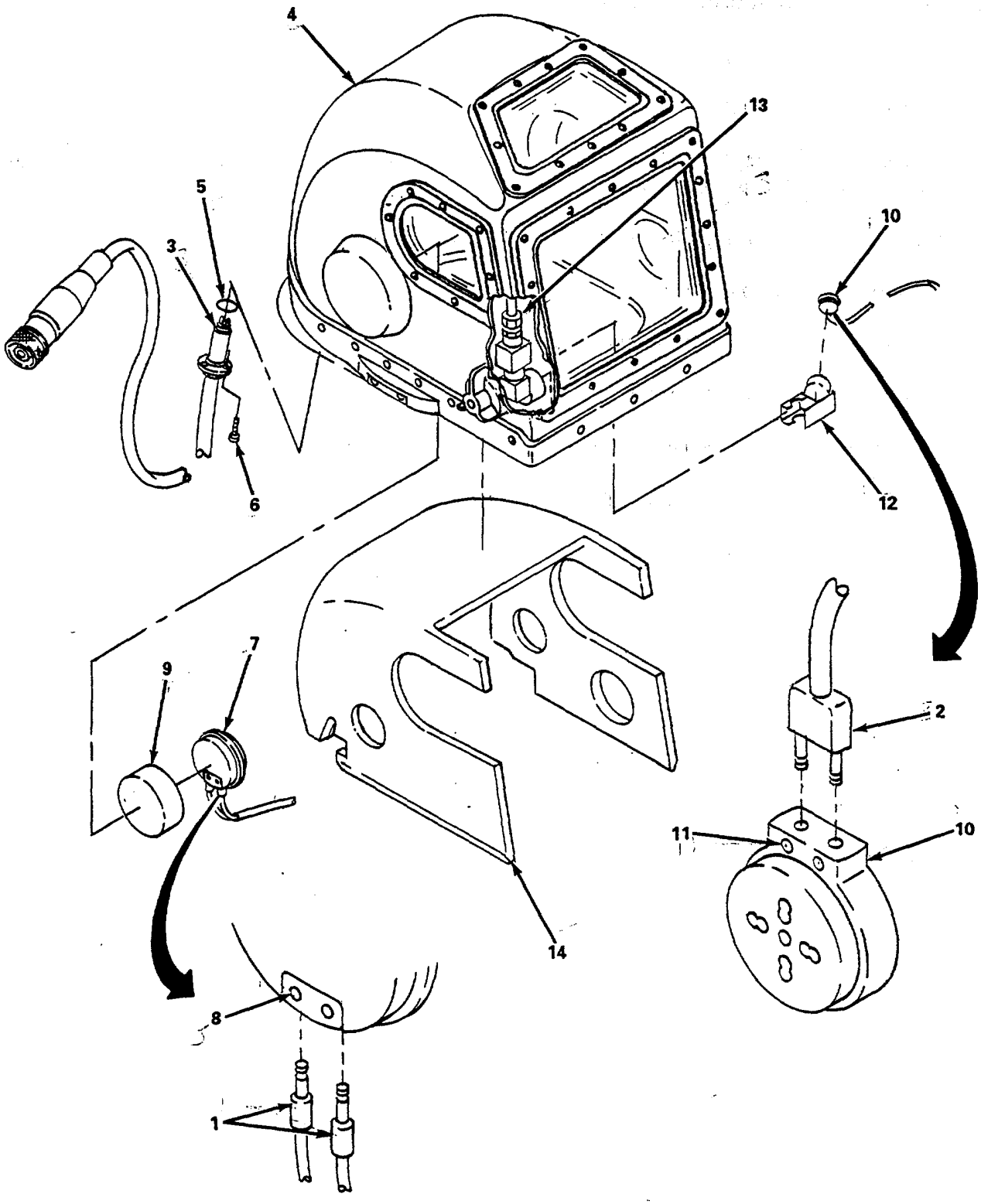


Figure 4-26. Helmet Communications Assembly, Assemble.

4-26. Helmet Communications (Cont).

c. Repair.

(1) *Replace microphone.* (figure 4-27)

(a) Remove helmet liner (1).

(b) Remove microphone holder (2) with microphone (3) from air supply tube (4).

(c) Remove holder (2) from microphone (3).

(d) Loosen two setscrews (5)and remove connector (6) from microphone (3).

(e) Connect connector (6) to new microphone (3) and tighten two setscrews (5).

(f) Install microphone (3) on holder (2) and install holder (2) on air supply tube(4).

(g) Install helmet liner (1).

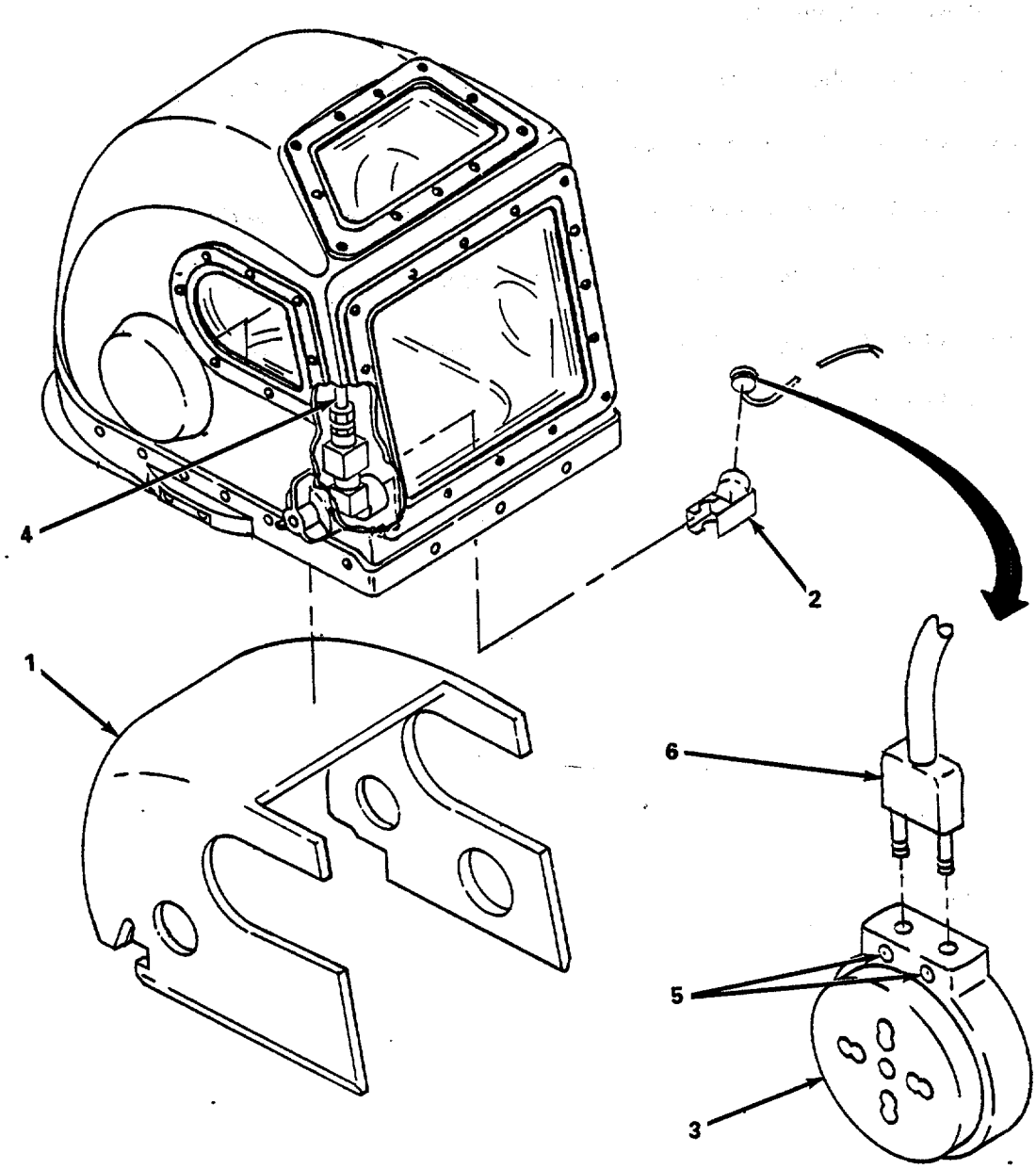


Figure 4-27. Microphone, Replace.

4-26. Helmet Communications (Cont).

(2) *Replace speaker.* (figure 4-28)

NOTE

There is a left and right hand speaker, the procedures to replace them are the same.

(a) Remove helmet liner (1).

(b) Remove speaker (2) from holder (3).

(c) Loosen two setscrews (4) and tag and remove leads (5) from speaker (2).

(d) Connect leads (5) as tagged to new speaker (2) and tighten two setscrews (4).

(e) Install speaker (2) in holder (3).

(f) Install helmet liner (1).

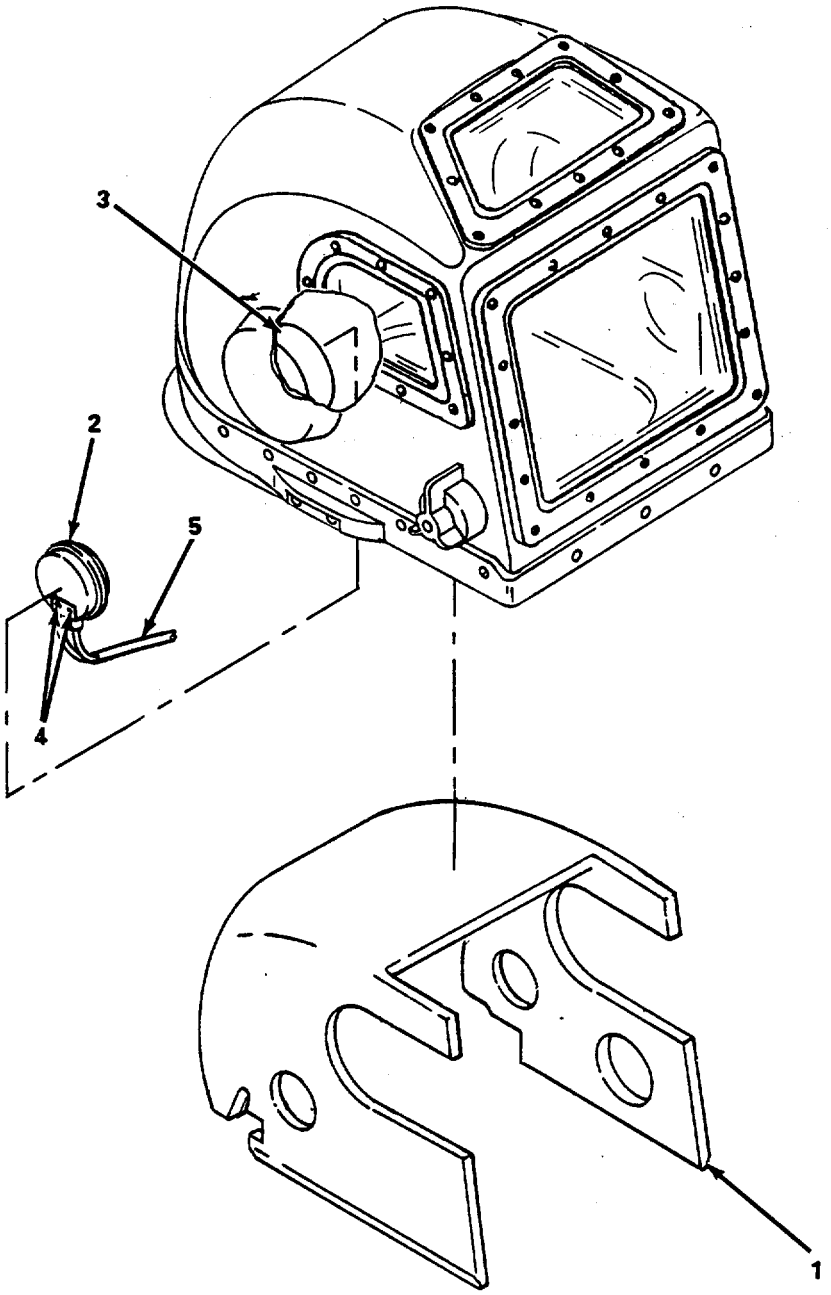


Figure 4-28. Speaker, Replace.

4-27. Communications Whip.

This task covers: Test

INITIAL SETUP:

Tools

Multimeter (Item 52, Appendix B)

Test. (figure 4-29)

(1) Pull back boot (1) on whip connector (2) inside of helmet (3).

(2) Perform a continuity test on communications whip (3).

(3) Notify your supervisor if communications whip (3) is defective.

(4) Reposition boot (1).

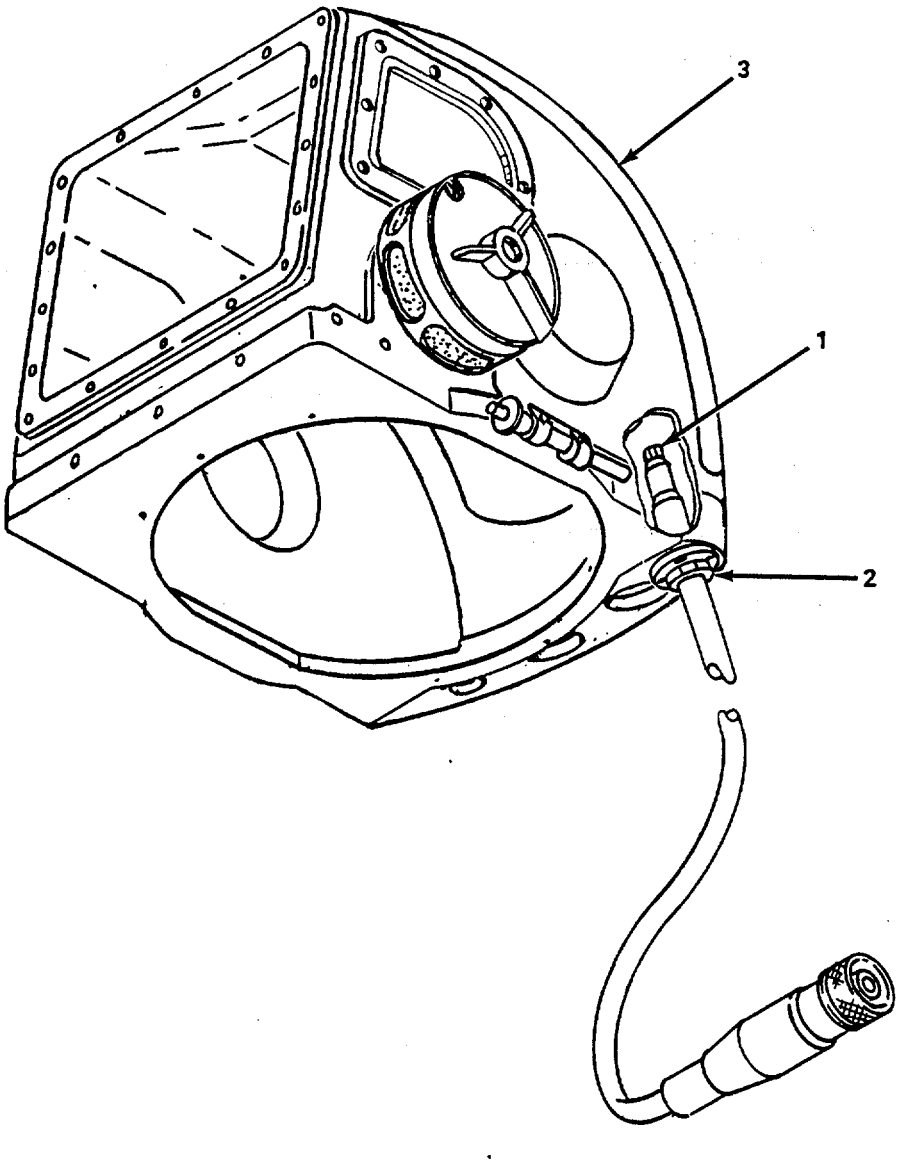


Figure 4-29. Communications Whip, Test

4-28. Helmet Liner.

This task covers: Replace

INITIAL SETUP

Materials/Parts

Helmet Liner

Replace. (figure 4-30)

(1) Remove liner (1) from helmet (2) being careful not to rip helmet liner (1).

(2) Install helmet liner (1) in helmet (2).

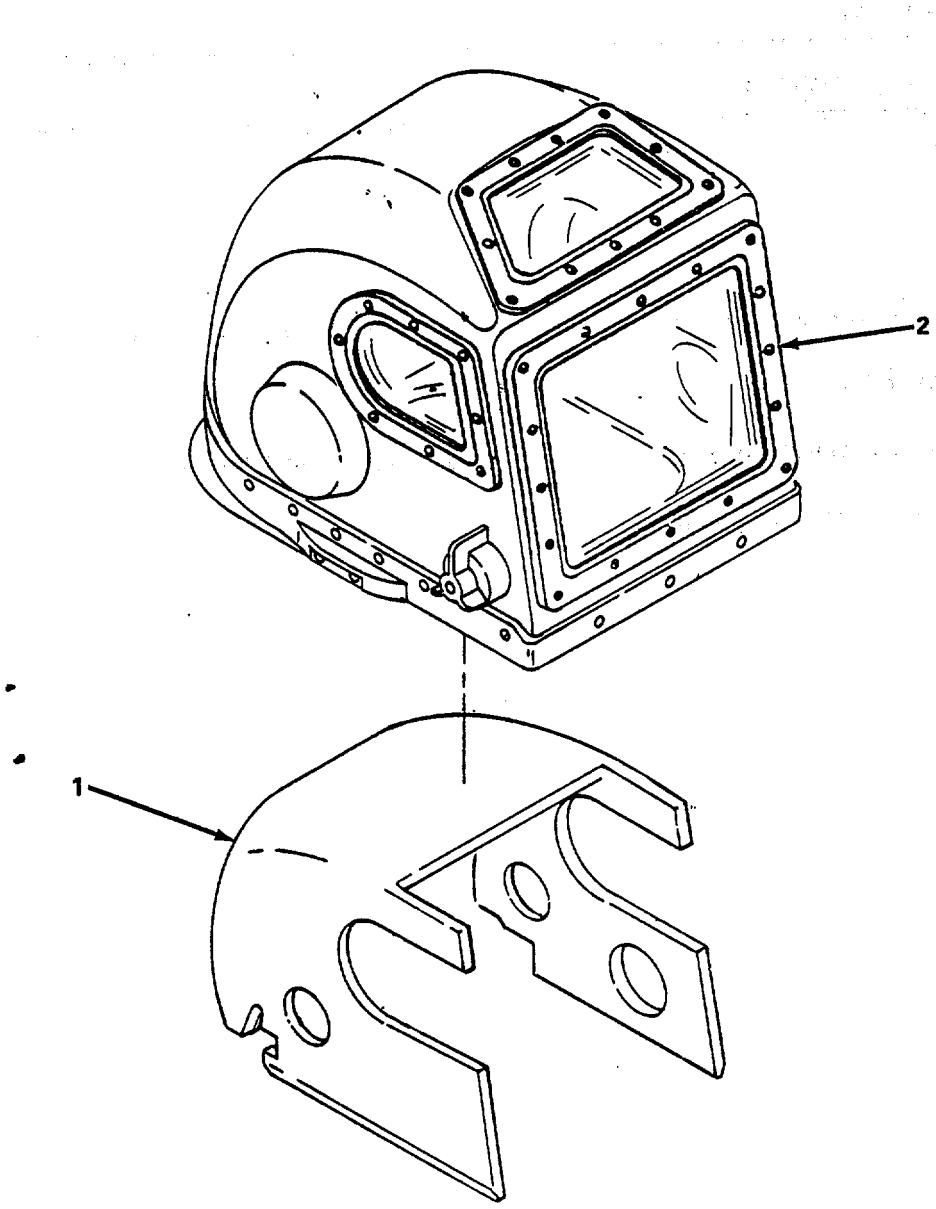


Figure 4-30. Helmet Liner, Replace.

4-29. Helmet Ducts.

This task covers: a. Replace (Supply Duct) b. Replace (Return Duct)

INITIAL SETUP

Materials/Parts

Wrap, Nylon Tie (Item 28, Appendix B)
Left Return Duct
Right Return Duct
Connector
Connector
Supply Duct
Helmet Weight

Materials/Parts (Cont)

RTV Sealant (Item 1, Appendix E)
Tape, Hook and Eye

Equipment Condition

Helmet liner removed (para. 4-28).

a. Replace (Supply DucO. (figure 4-31)

(1) Remove supply duct (1), tie wraps, and connector (2).

(2) Ensure mounting surface on inside of helmet (3) is clean.

(3) Apply adhesive to mounting surface of connector (2) and supply duct (1).

(4) Install connector (2), supply duct (1), and tie wrap.

(5) Install hook and eye tape (4) to supply duct (1) and secure with adhesive.

FOLLOW-ON MAINTENANCE
Install helmet liner (para. 4-28).

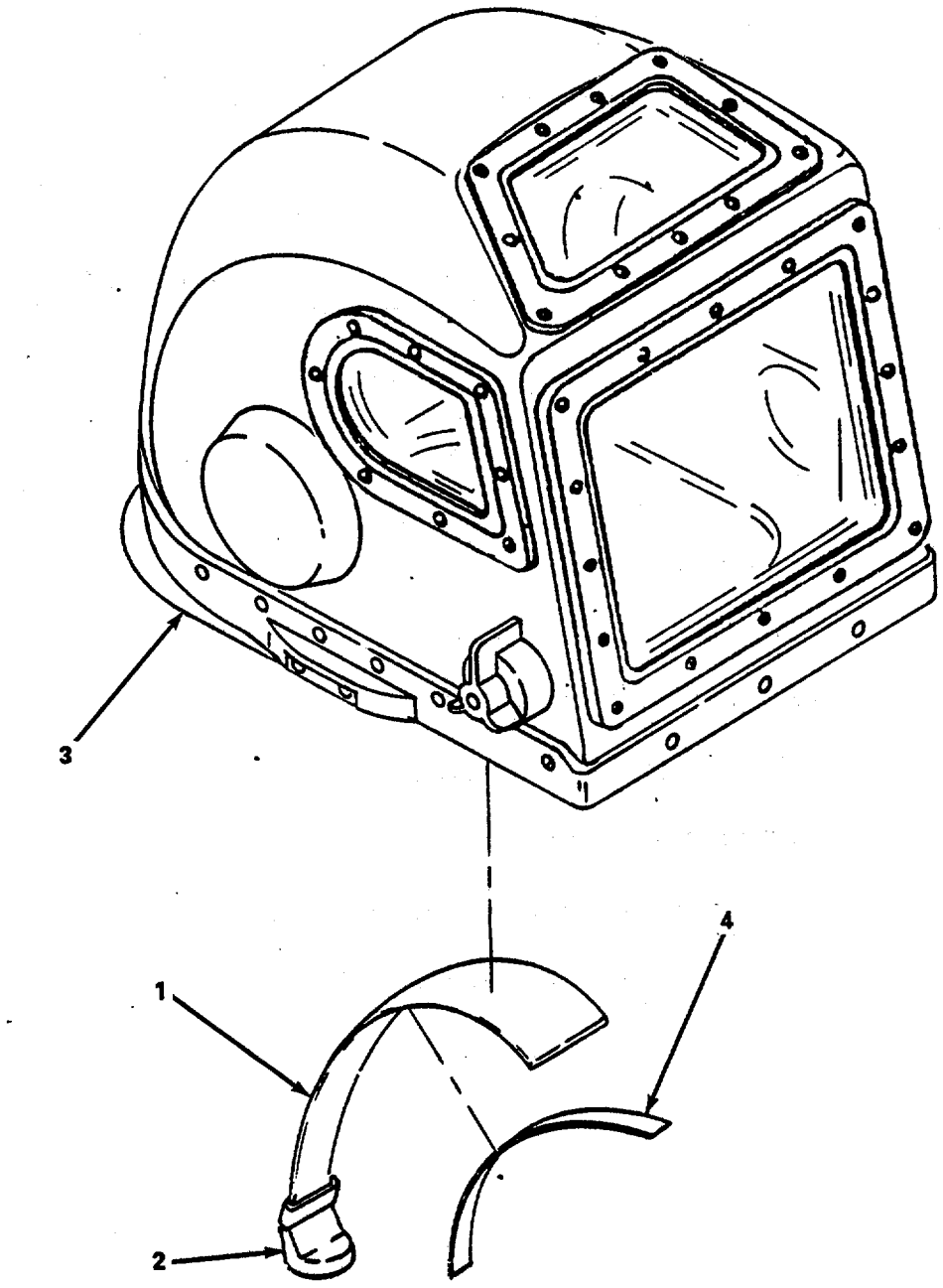


Figure 4-31. Supply Duct, Replace.

4-29. Helmet Ducts (Cont).

b. Replace (Return Duct. (figure 4-32)

(1) Remove left return duct (1), right return duct (2), connector (3), and tie wrap.

(2) Apply adhesive to mating surface on connector (3).

(3) Install connector (3), right return duct (2), left return duct (1) and tie wrap.

FOLLOW-ON MAINTENANCE
Install helmet liner (para 4-28).

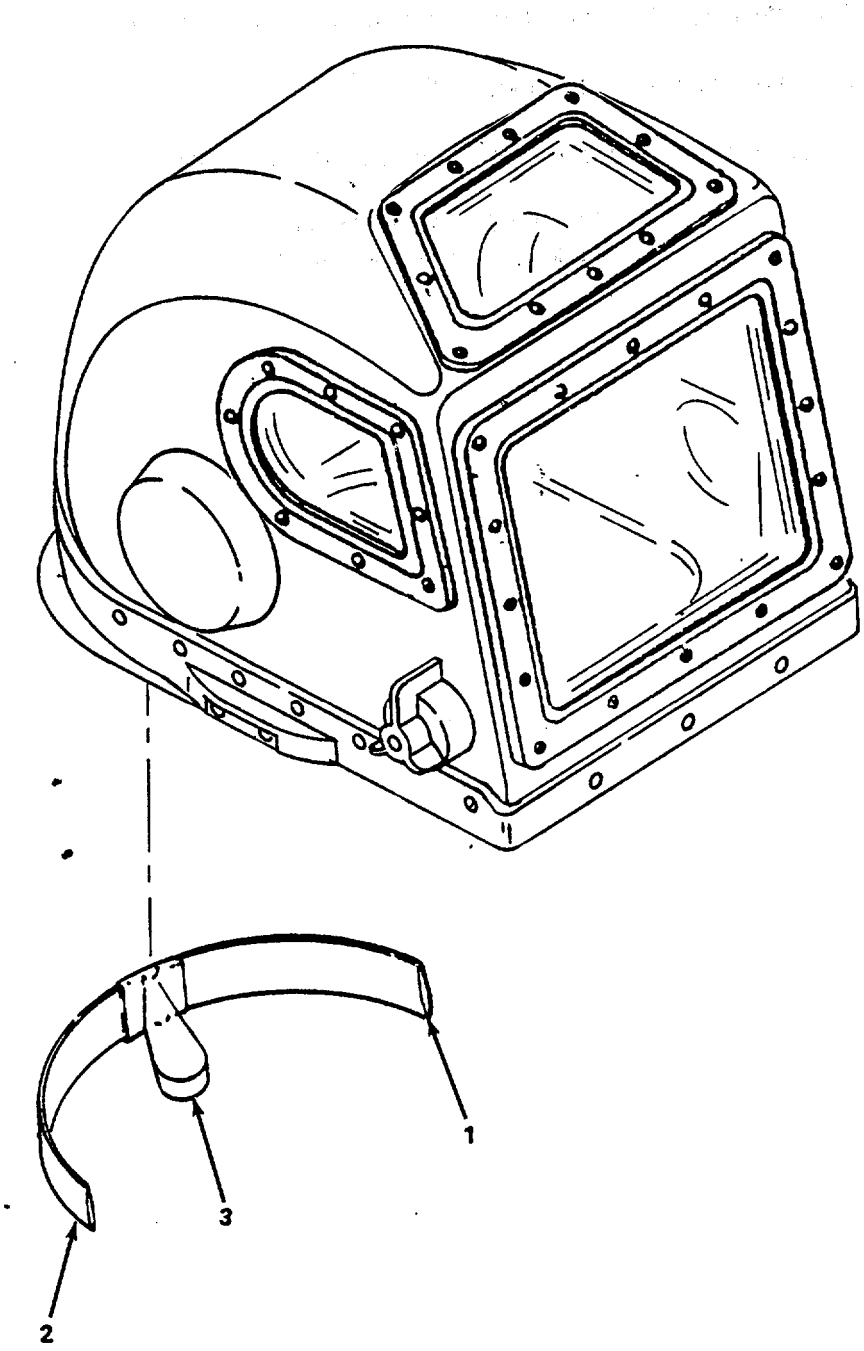


Figure 4-32. Return Duct, Replace.

4-30. Air Supply Whip.

This task covers: a. Service b. Replace

INITIAL SETUP

Tools	Reference
1 3/8 Box and Open End Wrench (Item 12, Appendix B)	Para. 4-11 General

Materials/Parts

Air Supply Whip
Cleaning Solution (NID) (Item 6, Appendix E)

a. Service. (figure 4-33)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Remove air supply whip (1) from helmet (2).

(2) Clean air supply fittings (3) and (4) with hot soapy water, and rinse thoroughly with clean water.

(3) Inspect air supply whip (1) and fittings (3) and(4).

(4) Replace air supply whip (1) if cracked or bulged or if fittings (3) and (4) are damaged.

(5) Install air supply whip (1).

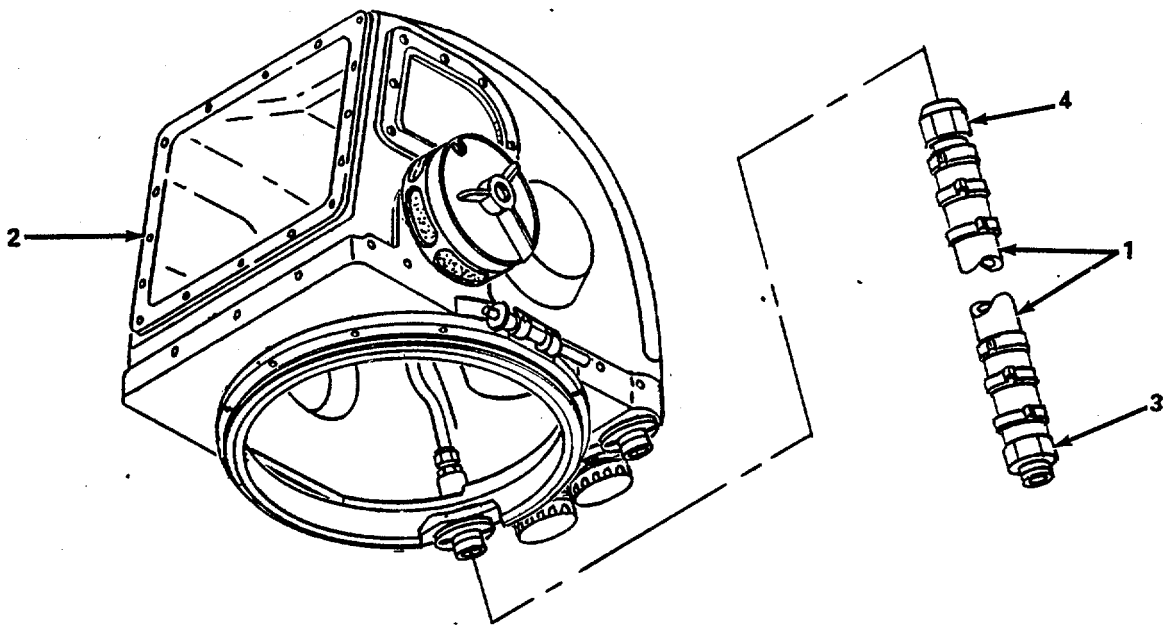


Figure 4-33. Air Supply Whip, Service.

4-30. Air Supply Whip (Cont).

b. Replace. (figure 4-34)

(1) Remove air supply whip (1) from helmet (2).

(2) Ensure connector (3) on helmet (2) is clean.

(3) Install new supply whip (1).

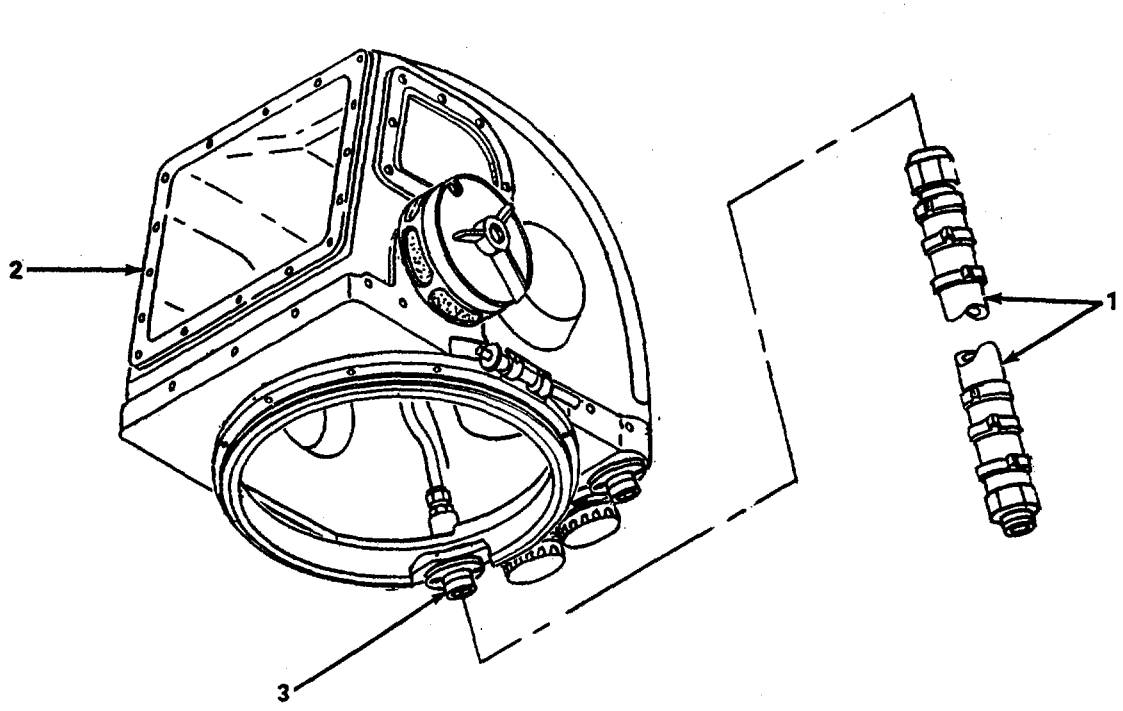


Figure 4-34. Air Supply Whip, Replace.

4-31. Umbilical.

This task covers: Replace

INITIAL SETUP

Materials/Parts	Reference
Umbilical	Para. 4-11 General

Replace.

(1) Diver end. (figure 4-35).

(a) Remove boot (1) from umbilical (2).

(b) Loosen connector nuts (3) and disconnect air hose (4) and communications cable (5) from air supply whip (5).

(c) Loosen connector (6) and disconnect communications cable (7) from communications whip (8).

(d) Remove snap shackle (9) from D-ring (10).

(e) Connect snap shackle (9) to D-ring (10).

(f) Connect communications cable (7) to communications whip (8) and tighten connector (6).

(g) Connect air hose (4) to air whip (5) and tighten connector (3).

(h) Install boot (1).

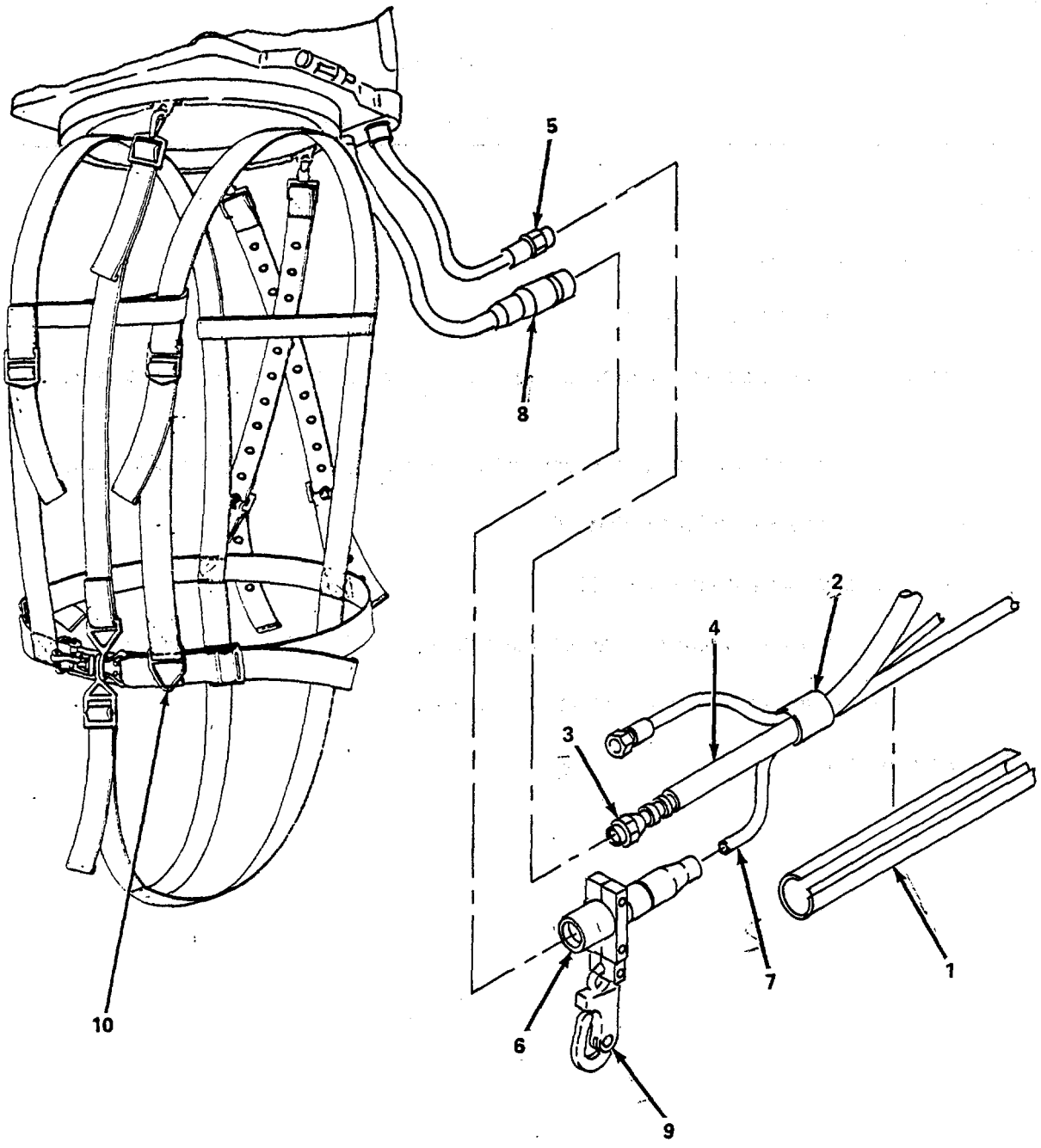


Figure 4-35. Diver End Umbilical, Replace.

4-31. Umbilical (Cont).

(2) Surface end. (figure 4-36).

(a) Loosen connector nut (1) and disconnect air hose (2) from air supply.

(b) Loosen connector nut (3) and disconnect pneumofathometer hose (4) from gage fitting.

(c) Loosen connector nut (5) and disconnect communications cable (6) from communications box (7).

(d) Connect communications cable (6) to communications box (7) and tighten connector nut (5).

(e) Connect pneumofathometer hose (4) to gage fitting and tighten connector nut (3).

(f) Connect air hose (2) to air supply and tighten connector nut (1).

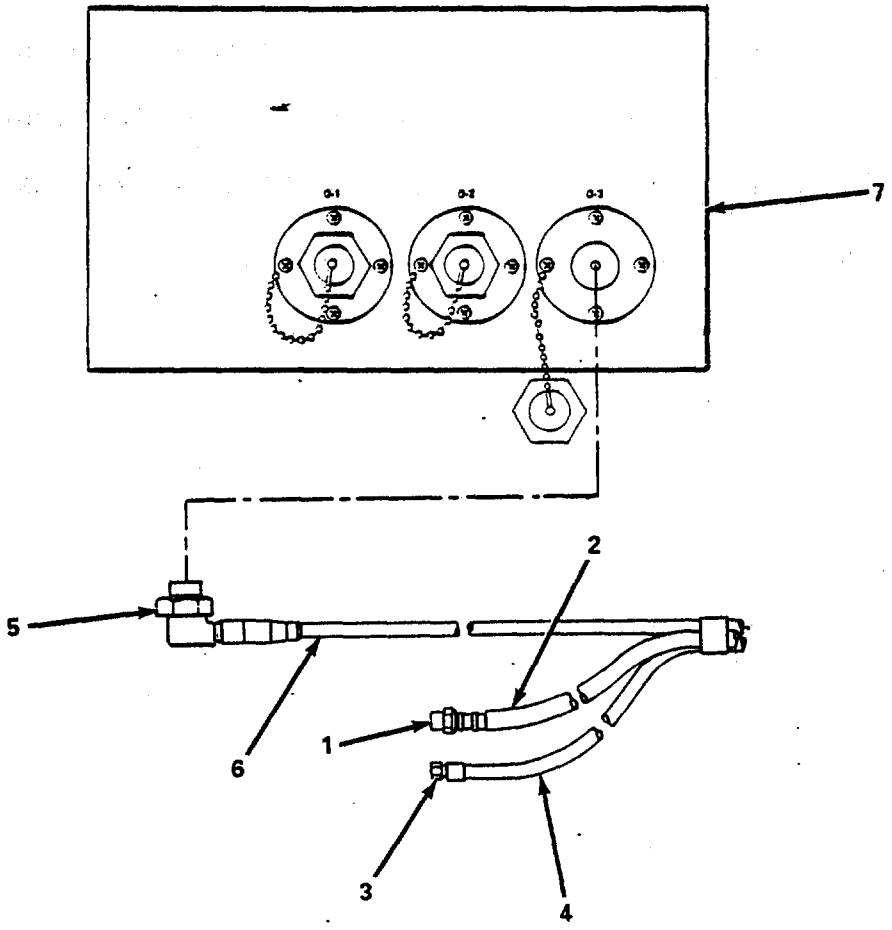


Figure 4-36. Surface End Umbilical, Replace.

4-32. Communications Box.

This task covers: Replace

INITIAL SETUP

Tools	Materials/Parts
1 7/8-inch Box and Open End Wrench (Item 18, Appendix B)	Communications Box

Replace. (figure 4-37)

(1) Disconnect any cables attached to DIVER 1 (1), DIVER 2 (2), DIVER 3 (3), and/or EXT SPKR (4) plugs.

(2) Disconnect D-1 (5), D-2 (6), and/or D-3 (7) cables at rear of box.

(3) Connect DIVER 1 (1), DIVER 2 (2), DIVER (3), and/or EXT SPKR (4).

(4) Connect D-1 (5), D-2 (6), and/or D-3 (7) cables to rear of box.

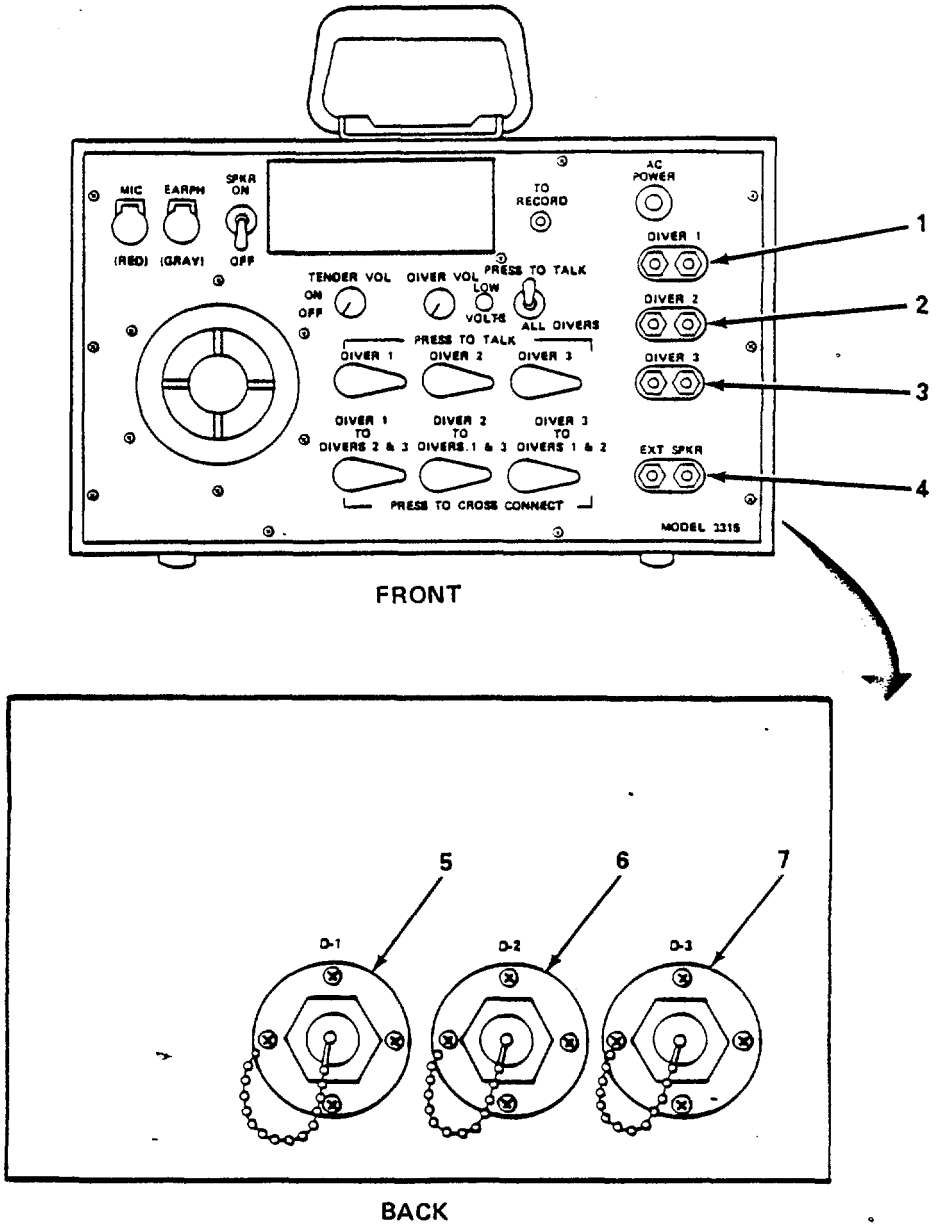


Figure 4-37. Communications Station, Replace.

SECTION VI. PREPARATION FOR STORAGE OR SHIPMENT

4-33. Storage Requirements. Because the MK12 SSDS is a life support system, careful handling and storage is required. Specific storage requirements for certain components are covered by the storage serviceability standards supply bulletin SB 7402-97-01 for TROSCOM material diving equipment sets ancillary items, life support equipment ancillary items.

a. Short Term Storage. Components for the breathing system are packaged individually inside two heat-sealed bags. These bags maintain the components in a clean condition; the components should not be removed until installation on the MK12 SSDS. When stored or shipped, components shall be packaged in the MK12 SSDS storage container.

b. Long Term Storage. If components are to be stored for more than three months, prepare for storage as described in the unit operating procedures. Wrapping and packing are not required unless shipment is anticipated.

c. Storage Precautions. General storage precautions are listed below:

(1) Components shall not be stored near fire or at temperatures higher than 120°F (48.9°C) or lower than 0°F (-17.80C). The equipment shall not be exposed to direct sunlight for prolonged periods as sunlight has a deteriorating effect on rubber components such as hoses and cables.

(2) Components shall be clean and dry with specific parts lightly lubricated as specified for MK12 SSDS, this prevents damage and deterioration during storage.

(3) To protect equipment from dust, dirt, and humidity, components shall be sealed in bags with desiccant packages.

(4) To prevent damage from pressure and weight, components shall not be stacked unless wrapped and packed. Care shall be taken to prevent continuous distortion of flexible parts and pressure from heavy parts on fabric or rubber components during storage. Rubber items shall be stored without folding or creasing to prevent permanent distortion of the items.

(5) To prevent damage and deterioration, do not lay components or sealed plastic bags on bare concrete, masonry, or earth floors for prolonged periods. Storage racks should be at least six inches from the floor. Ensure that the storage area is well ventilated, and no corrosive or violative fumes or grease are present.

SECTION VII. UNIT LEVEL CLEANING PROCEDURE FOR DIVING LIFE SUPPORT AIR SYSTEMS

4-34. General. This section covers the cleaning procedures for diving life support air systems. The importance of maintaining a diver's air breathing system in a clean and operable condition cannot be over emphasized. This procedure provides basic steps and methods for removing and installing components and piping, and provides the simplified methods for cleaning small components, pipes and hoses for air systems, and methods for cleaning component soft goods.

4-35. Determining System Cleanliness. A periodic inspection of the air system will verify system cleanliness. If a system is suspected of contamination, a hydrocarbon an analysis, a particulate sample may be taken or a gas sample may be drawn to determine the level of system cleanliness. These samples can be coordinated through the U.S. Army Troop Command, ATTN: AMSTR-M, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798.

4-36. Clean Area. All cleaning for life support air systems to be performed on components and piping shall be cleaned in a "clean area." This area shall be isolated from oil, grease, paper, lint particles and other airborne contaminates. It shall be as free as possible of dust and debris. Work benches shall be covered with easily cleaned surfaces such as stainless steel, synthetic rubber, vinyl linoleum or formica. Floor shall be non-dusting. Walls and ceiling shall be covered with washable vinyl, latex paint or polyurethane-based paint.

4-37. **Removing and Installing System Components or Piping** . The following steps are guidelines for the removal and installation of piping or components from or into a clean system. In general, common sense and clean work habits must prevail at all times to maintain system cleanliness. Prior to the removal of any pipe or component, appropriate maintenance forms are to be completed and approved.

a. Removal. Extreme care shall be used in the removal of any component or pipe from a clean system to avoid introducing any contamination. To eliminate any chance of contamination, the following steps shall be adhered to:

(1) Secure the system by closing valves and controls both upstream and downstream of the component or pipe to be removed. The components shall be tagged to insure that gas is not brought on line.

(2) Removal of all debris from the intended area of assembly or disassembly such as dirt, dust, loose paint, and grease is mandatory. This includes cleaning the pipe or component which is to be removed and the adjacent components or piping.

(3) Wipe all of the external surfaces of components and piping with detergent or alcohol solvent to remove grease or dirt.

(4) All personnel shall have clean hands.

(5) All tools used in the removal must be clean and grease-free.

(6) Remove component or piping.

(7) Immediately bag or seal all exposed ends of system with plastic.

b. Installation or Reinstallation.

(1) The new component or cleaned pipe shall be wrapped or doublebagged. If not, the item shall be returned for cleaning.

(2) The component or piping shall be removed from bagging and shall be inspected for damage at the mating surfaces, threads, or connecting surfaces and any primary surface. Inspect for dust or minor particle contamination, and remove with lint-free rag.

(3) Mating components and pipe shall have protection materials or plugs removed.

(4) Mating surfaces, preformed packings and threads shall be coated lightly with an approved lubricant. Threaded surfaces must be coated to prevent galling of threads at assembly.

(5) A pressure test shall be performed to verify that there are no leaks and that the correct fittings have been installed in the system.

4-38. Pre-Cleaning of Components or Piping. Upon receipt of new components not cleaned or components and pipe removed from the system for cleaning, the item shall be pre-cleaned. Doing this shall prepare the component for final cleaning. Pre-cleaning will be accomplished in an area separate from the clean area. The pre-cleaning will include but is not limited to the following:

a. All wrapping shall be removed.

b. Loose paint, rust, brackets, panels, tags, supports and other such items shall be removed.

c. If hydrocarbons and/or other contaminants are known to have been introduced into the component or piping, a thorough degreasing procedure shall be initiated. Trisodium phosphate (TSP) or non-ionic detergent (NID) may be used.

d. Visually inspect the pre-cleaned articles under bright light to ensure that all gross contamination has been removed.

e. Bag all components and ends of pipe with plastic to await cleaning.

4-39. Cleaning Method - Non-Ionic Detergent. This method outlines the cleaning procedures for oil-free cleaning of metallic/nonmetallic components or assemblies using non-ionic detergent. This procedure is only to be used if there is no equipment available to conduct the TSP cleaning method.

a. Cleaning Components or Assemblies (excluding hose assemblies).

CAUTION

Chemical protective gloves should be worn to prevent skin irritation from detergent and hot water.

(1) Disassemble components down to the smallest parts. Separate soft goods and clean as specified in paragraph 4-40.

(2) Clean each component by scrubbing with a non-ionic detergent solution (1/2 teaspoon 2.4 mL) detergent to 1 gallon (3.8 L) water using a nylon bristle brush and clean cloths.

(3) Rinse with distilled water at 125 degrees F (54 degrees C) until effluent shows no visible signs of detergent.

(4) Collect some of the water rinsed over the items in a flask that can be fitted with a rubber stopper. Shake the flask for a few seconds and if any bubbles form and remain on the surface of the water in the flask, continue to rinse item until no bubbles form and remain in the sample flask.

(5) Purge with dry, oil-free nitrogen until visually dry, or allow to air dry. The following dated and signed records shall be maintained:

(a) Identification of all parts cleaned.

(b) Results of shake test.

(6) Reassemble as outlined on assembly or component drawing.

(7) Double bag all components in plastic and close securely.

b. Cleaning Hose Assemblies.

(1) Clean hose assemblies in accordance with the following steps using the specific materials and utilizing proper equipment. Pre-clean hose assemblies outside the clean area by rinsing externally with distilled water.

(2) Most hose assemblies will not lend themselves to disassembly. Disassemble to maximum extent without removing fittings or clamps.

(3) The cleaning solution shall be made by adding 1/2 ounce (14.7 mL) non-ionic detergent to each 80 gallons (302.8 L) or distilled water.

(4) Heat the cleaning solution to 120 degrees F (49 degrees C) and circulate through the hose assembly for 30 minutes at a flow rate of not less than 1 gallon (3.8 L) per minute.

(5) Rinse the hose assembly with distilled water heated to 125 degrees F (52 degrees C) for 30 minutes minimum at a flow rate of not less than I gallon (3.8 L) per minute. Do not recirculate the water.

(6) Perform a shake test by collecting a 1000 mL sample of rinse water in a flask that can be fitted with a rubber stopper. Shake the flask for a few seconds and if any bubbles form and remain on the surface of the water in the flask, continue to rinse the hose until no bubbles form and remain in the sample flask.

(7) Purge hose assembly with clean, dry, oil-free nitrogen (preferably heated to 200 degrees F (93 degrees C)) until all visible signs of water are absent. Continue drying process for 1 to 2 hours after initial purge.

NOTE

At no time shall the upstream purge pressure for all hose assemblies exceed 100 psig (6895 millibars).

(8) After drying, cover each hose end with a clean plastic bag to maintain internal cleanliness. Secure the bag with 1 inch (2.5 cm) wide tape.

(9) When components and systems have been reassembled an air sample shall be taken to verify cleanliness.

4-40. Cleaning Method Trisodium Phosphate (TSP). This method is the preferred method if all equipment is available. A steam/hot water cleaner that has adjustable siphon control for cleaning applications works well.

a. For components the following steps should be followed:

WARNING

The TSP cleaning solution is harmful to eyes and skin. Wear chemical protective apron, gloves and goggles/face shield when handling or working with the solution.

(1) Prepare a solution consisting of 2 pounds (0.9 kg) TSP, 0.5 ounces (14.7 mL) non-ionic detergent and 80 gallons (302.8 L) of distilled or deionized water.

(2) Heat solution to 165 degrees F (74 degrees C) mixing occasionally during the heating.

(3) Disassemble components down to the smallest parts (separate and clean soft goods and aluminum parts as specified in paragraph 4-40) and soak in the solution for 10 minutes minimum, 30 minutes maximum.

(4) After soaking, clean the parts in the ultrasonic cleaner until all visible traces of contaminate dirt or grease are gone.

(5) For components too large for an ultrasonic cleaner, scrub the parts with a nylon bristle brush until all visible traces of contaminate dirt or grease are gone.

(6) Rinse all parts in running hot distilled water or deionized water until all visual traces of cleaning solution are removed.

(7) Draw 10 mL sample. Agitate or rinse water to observe for soap bubbles. If any soap bubbles are present, repeat steps (6) and (7) until no bubbles are observed.

(8) Blow dry components with clean air, nitrogen or helium.

(9) Reassemble components using an approved lubricant.

(10) Bag and seal or tape closed all components and ends of pipe or hoses with plastic until ready for reinstallation.

b. For cleaning pipe or tubing the following procedures should be followed:

(1) Determine the volume of cleaning solution estimating the length of pipe or hose to be cleaned and the size of the pipe to be cleaned. Look up the appropriate pipe/tube size and then the corresponding volume (in cubic inches) per one foot length in table 4-3. Multiply that volume by the estimated length to be cleaned. After the total volume is calculated, multiply the answer in cubic inches by .00433. After the total volume is calculated, multiply the answer in cubic inches by 00433 to obtain the number of gallons to fill the system. Determine applicable flow rate from table 4-4 and multiply flow rate by thirty (30) to compute number of gallons required to pump through the system. Add volume required to fill system and the volume required to pump through the system for the total volume of cleaning solution required.

Table 4-3. TSP Cleaning Solution Volume.

Pipe/Tube Size in (cm)	Volume of 1 Foot (30 cm) Length
1/4 (0.6 cm)	0.6 cubic inches (9.7 cm3)
3/8 (1.0 cm)	1.3 cubic inches (21.7 cm3)
1/2 (1.3 cm)	2.4 cubic inches (38.6 cm3)
3/4 (1.9 cm)	5.3 cubic inches (86.9 cm3)
1 (2.5 cm)	9.4 cubic inches (154.5 cm3)
1-1/2 (3.8 cm)	21.2 cubic inches (347.6 cm3)
2 (5.1 cm)	37.7 cubic inches (617.9 cm3)

(2) Prepare a solution at a ratio of 2 pounds (0.9 kg) of TSP, 0.5 ounces (14.7 mL) non-ionic detergent for each 80 gallons (302.8 L) of distilled or deionized water as determined.

(3) Heat solution to 165 degrees F (74 degrees C) mixing occasionally during the heating.

(4) Pump the cleaning solution through the pipe/tubing for 30 minutes at a rate listed in table 4-4 using the solution pump, and maintain constant temperature at all times. It may be necessary with some piping configurations to cap or plug some openings and alternate with others to maintain even flow of cleaning

solution to all segments of the pipe. If you run out of cleaning solution prior to the 30 minutes listed, prepare another volume of cleaning solution.

Table 4-4. Cleaning Solution Flow Rate.

Tube Size (inches)	GPM	Pipe Size (inches)	GPM
1/4 (0.6 cm)	1/2	1/4 (0.6 cm)	2
3/8 (1.0 cm)	2	3/8 (1.0 cm)	3
1/2 (1.3 cm)	3 3/4	½ (1.3cm)	5 1/2
3/4 (1.9 cm)	6 3/4	3/4 (1.9 cm)	9 1/2
1 (2.5 cm)	12 1/2	1 (2.5 cm)	15 1/2
		1 1/4 (3.1 cm)	23
		1 1/2 (3.8 cm)	35
		2 (5.1 cm)	50

(5) Pump hot distilled or deionized water through the system to rinse until all visible traces of cleaning solution are removed.

(6) Draw 10 mL sample. Agitate to observe for soap bubbles. If any soap bubbles are present, repeat step (5) until no bubbles are observed.

(7) Blow dry parts or components with clean, dry, oil-free nitrogen (preferably heated to 200 degrees F (93.3 degrees C)) until all visible signs of water are absent. Maintain process for 1 to 2 hours after initial purge.

(8) Double bag and seal or tape closed all components and ends of pipe or hoses with plastic until ready for reinstallation.

c. Hoses shall be cleaned as specified in paragraph 4-38.

4-41. Cleaning Component Soft Goods. The following isopropyl alcohol method is provided for the cleaning of the soft goods and aluminum parts of system components. The method for non-ionic detergent is the same procedure as that in paragraph 4-38.

CAUTION

Ensure ventilation is adequate and avoid breathing vapors.

Personnel should wear chemical protective gloves to prevent skin irritation when contact with isopropyl alcohol is necessary.

Isopropyl alcohol shall be maintained in a covered container to preclude excess concentrations in the air for fire protection. The cover should be removed only for placement or removal of soft goods.

NOTE

Table 4-5 lists all compatible cleaning agents for general soft goods used in the Army diving systems. Only the isopropyl alcohol procedure is listed below.

a. Soak component soft goods or aluminum parts in a tray of isopropyl alcohol for 10 minutes maximum.

b. Wipe each piece of soft good individually with wipes soaked in isopropyl alcohol. Do this until all dirt and foreign matter is visually removed.

c. Rinse soft goods with fresh isopropyl alcohol.

d. Blow dry with air, nitrogen, or helium.

Table 4-5. Cleaning Agents Comparable with Soft Goods.

Soft Goods	Freon PCA MIL-C-81302B	TSP O-S-642	NID MIL-D-16791	IA TI-1-735A
Adiprene C	X		X	
Adiprene L	X		X	
Buna N	X	X	X	X
Buna S	X	X	X	X
Butyl			X	X
Delrin	X	X	X	
Epoxy Resin	X		X	
Kel-f	X	X	X	X
Hypalon 40	X		X	
Kralartic	X		X	
Lexan	X		X	
Lucite	X		X	
Neoprene W	X		X	
Nylon		X		X

Table 4-5. Cleaning Agents Comparable with Soft Goods (Cont).

Soft Goods	Freon PCA MIL-C-81302B	TSP O-S-642	NID MIL-D-16791	IA TI-1-735A
Polyethylene 7050				
Polyethylene 9140	X	X	X	X
Polyvinyl Chloride	X	X	X	X
Surlyn A	X		X	
Teflon TFE	X	X	X	X
Teflon FEP	X	X	X	X
Thiokol FA	X		X	X
Viton A	X	X	X	X
Viton B	X	X	X	X
Zytel 101	X		X	
Ethylene Propylene		X	X	X

X - Solvent is compatible with soft goods.
Blank - Solvent is not compatible with soft goods.

4-42. Hydrocarbon Inspection and Analysis.

a. Visual Method. By definition, visibly clean is the absence of all particulate and non-particulate matter visible to the normal, unaided (except for corrected vision) eye. Particulate is identified as matter of miniature size with observable length, width and thickness. Non-particulate is film matter without definite dimension. Examples of visual inspection are:

(1) A clean cloth placed over the discharge end may collect particulates and debris when air or nitrogen is blown through the system.

(2) A component that has been "in service" may have visible signs of grease, dirt, etc.

(3) Absorption of oil or grease on a clean filter paper from a surface wipe.

b. Ultraviolet Light Method. The ultraviolet method for detecting hydrocarbons may be employed in different ways.

WARNING

Most ultraviolet lamps contain mercury. Extreme caution should be taken not to break the mercury vapor lamp which will contaminate the component or pipe being inspected and may also cause human injury.

(1) Direct inspection: The component may be examined directly with the ultraviolet light. By passing the component under the ultraviolet light, hydrocarbon surface contamination may exhibit fluorescence where some hydrocarbons exist.

(2) Inspection of cleaning solution when detergent is used. Used cleaning solution collected in a clean beaker when agitated will form bubbles. These bubbles, under ultraviolet light, may exhibit fluorescence.

4-43. Documentation and Record Keeping..

a. This diving system must retain certain records and documents to substantiate safety standards. The individual operating the clean area being directly involved with system maintenance should therefore be required to maintain records documenting cleaning operations in a systematic manner.

b. The purpose of this section is to set forth a guide for documentation and record keeping involved in cleaning operations and in no way intends to impose restrictions on the amount of paperwork a unit feels it requires to operate safely.

c. A sequential record should be maintained of components cleaned (i.e., regulators, pipe, and/or any component) affecting reentry into a certified system. It should include a written record of all cleaning analyses and testing accomplished as per this procedure. A data sheet should be completed for items cleaned and tested per this procedure. All other information which pertains to the cleaning and/or testing of a particular item shall be attached to or referenced on the data sheet. Such information should include, but not be limited to outside laboratory reports, vendor data, etc. The completed data sheet(s) will then be attached to the REC Report and referenced in the remarks column on the Reentry Control Log.

d. It is possible that certain data and results will apply to more than one data sheet. For example, it is possible that a sample for gaseous contaminants will be taken by sampling an entire system. This system will consist of numerous items, each having its own data sheet. To assure complete documentation, reference the results of the gaseous contamination analysis on each affected data sheet.

e. As a minimum the data sheet should reflect the following information:

(1) Unit

(2) Date

(3) Name of Point of Contact

(4) Description of Cleaning Performed

(5) Person Performing the Cleaning

(6) Results of any Analysis

(7) Description of Item Being Cleaned

(8) Part Number/NSN

(9) Remarks

CHAPTER 5

DIRECT SUPPORT MAINTENANCE

OVERVIEW

This chapter contains information for troubleshooting and maintenance of the MK12 SSDS by direct support maintenance personnel.

SECTION I. REPAIR PARTS; SPECIAL TOOLS; TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

5-1. Common Tools and Equipment. For authorized common tools and equipment, refer to the Modified Table of Organization and equipment (MTOE) applicable to your unit.

5-2. Special Tools, TMDE, and Support Equipment. Refer to RPSTL and the Maintenance Allocation Chart pertaining to direct support maintenance for the MK12 Surface Supported Diving System (SSDS).

5-3. Repair Parts. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-4220-225-24P for this equipment.

SECTION II. DIRECT SUPPORT TROUBLESHOOTING

5-4. General. This section contains troubleshooting procedures to determine the probable cause of observed equipment malfunctions. Tests or inspections are provided to isolate the faulty component and corrective actions are provided to eliminate the malfunction.

5-5. Direct Support Troubleshooting Procedures. Table 5-1 lists the common malfunctions that may occur during operation. Refer to the symptom index to locate the troubleshooting procedures for the malfunction. This manual cannot list all malfunctions nor all the corrective actions. If a malfunction is not corrected by the listed corrective actions, notify your supervisor.

SYMPTOM INDEX

Table 5-1. Direct Support Troubleshooting Procedures.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. LOSS OF COMMUNICATION, ALL DIVERS.

Step 1. Check communication box.

Repair damaged box (para. 5-16).

Step 2. Check communications whip.

Replace damaged communications whip (para. 5-13).

Step 3. Inspect umbilical communication cable.

Replace damaged umbilical (para. 4-31).

2. LOSS OF COMMUNICATION, ONE DIVER.

Step 1. Check communications box.

Repair damaged communications box (para. 5-16).

Step 2. Check communications whip.

Replace damaged whip (para. 5-13).

Table 5-1. Direct Support Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. LOSS OF COMMUNICATION, ONE DIVER (Cont).
Step 3. Inspect umbilical communication cable.
Replace damaged umbilical (para. 4-31).
3. WEAK OR INTERMITTENT SENDING AND RECEIVING, ONE DIVER.
Step 1. Check communications box.
Repair damaged communications box (para. 5-16).
Step 2. Check communications whip.
Replace damaged whip (para. 5-13).
Step 3. Inspect umbilical communication cable.
Replace damaged umbilical (para. 4-31).
4. TOPSIDE DOES NOT RECEIVE ONE DIVER.
Step 1. Check communications box.
Repair damaged communications box (para. 5-16).
Step 2. Check communications whip.
Replace damaged whip (para. 5-13).
Step 3. Inspect umbilical communication cable.
Replace damaged umbilical (para. 4-31).
5. ONE DIVER DOES NOT RECEIVE TOPSIDE.
Step 1. Check communications box.
Repair damaged communications box (para. 5-16).
Step 2. Check communications whip.
Replace damaged whip (para. 5-13).

Table 5-1. Direct Support Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
5. ONE DIVER DOES NOT RECEIVE TOPSIDE (Cont).
Step 3. Inspect umbilical communication cable.
Replace damaged umbilical (para. 4-31).
6. LEAK IN VIEWPORT ASSEMBLY.
Check viewports.
Replace damaged viewports (para. 5-9).
7. LEAK BETWEEN HELMET SHELL AND BASE.
Check helmet shell for damage.
Replace helmet shell (para. 5-14).

SECTION III. DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

5-6. **General.** This section contains MK12 Surface Supported Diving System (SSDS) maintenance procedures which are the responsibility of the direct support maintenance as authorized by the MAC and Source, Maintenance, and Recoverability (SMR) coded items. Maintenance procedures will be presented step-by-step in the order in which the work is logically performed. Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust or other contamination in accordance with Chapter 4, Section VII of this manual.

5-7. Lower Breech Ring.

This task covers:

Repair

INITIAL SETUP:

Tools	*Materials/Parts*
3/32-inch Hex Wrench (Item 22, Appendix B)	Lower Lug
0-50 lb-in. Torque Wrench (Item 19, Appendix B)	Halocarbon Grease 25-55 (Item 10, Appendix E)
Adapter, Socket Wrench (Item 41, Appendix B)	RTV Sealant (Item 1, Appendix E)
Hex Insert (Item 55, Appendix B)	Lower Breech Ring Retainer
9/64-inch Hex Wrench (Item 22, Appendix B).	Neck Dam
	Jocking Harness Bracket

Repair.

(1) *Replace (lowerlug).* (figure 5-1)

(a) Remove two screws (1) and lower lug (2).

(b) Apply a thin coat of lubricant to lower lug surface that contacts lower breech ring (3).

(c) Apply a thin coat of sealant to threads on screws (1).

(d) Install lower lug (2) and thread two screws (1) fingertight.

(e) Install lower breech ring (3) on helmet (4) (slide quick release pins into loaded position).

(f) Tighten lug screws (1) evenly and torque screws (1) to 18-20 in.-lb (2.1-2.3 Nm).

(g) Work both quick release pins to ensure they do not bind.

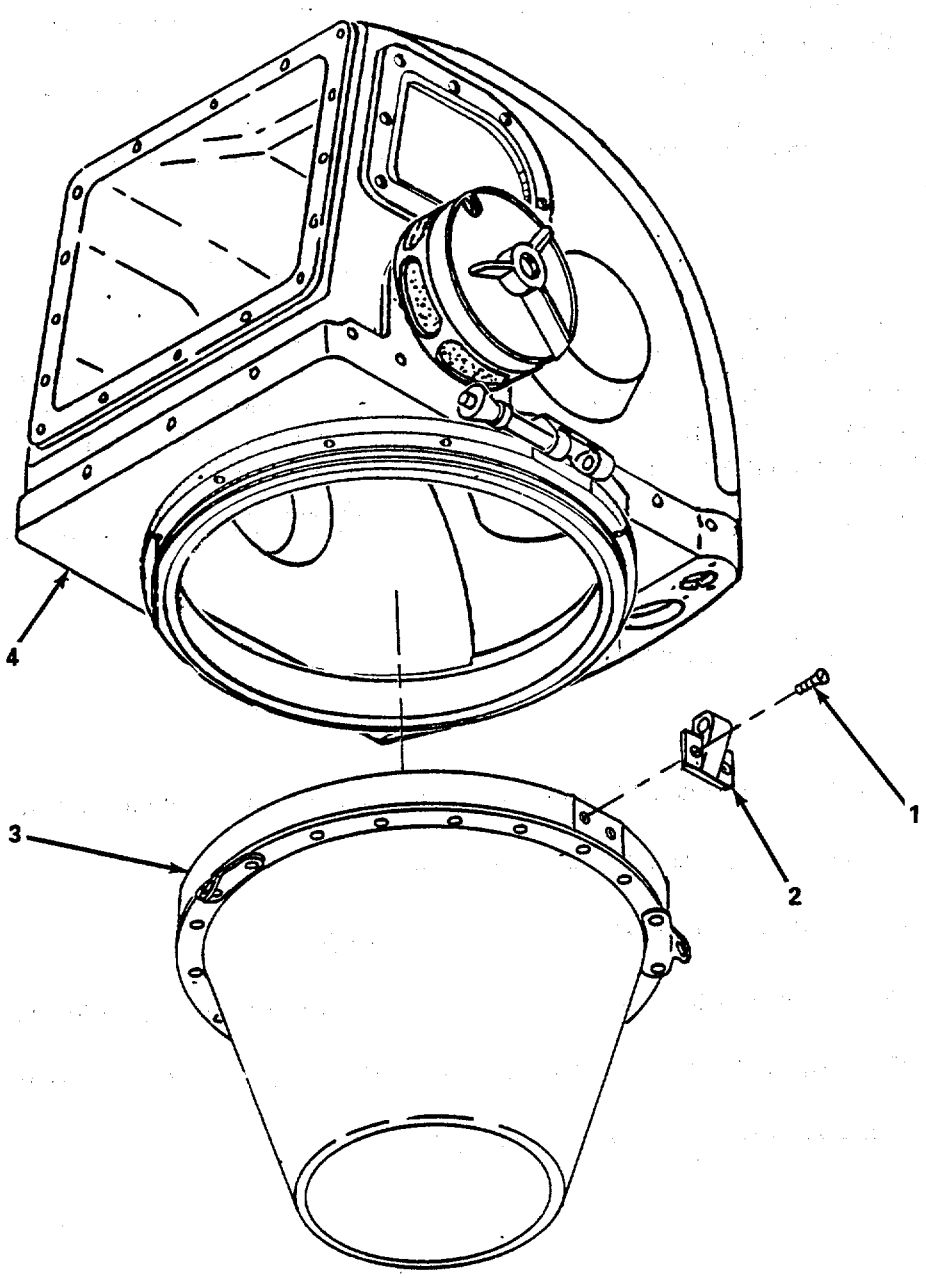


Figure 5-1. Lower Lug, Replace.

5-8. Lower Breech Ring (Cont)

(2) *Replace jocking harness bracket).* (figure 5-2).

(a) Remove two screws (1)) and remove jocking harnessbracket (2).

(b) Install new jocking harness bracket (2) and secure with two screws (1). Torque screws to 18-20 in.-lb (2.1-2.3 Nm).

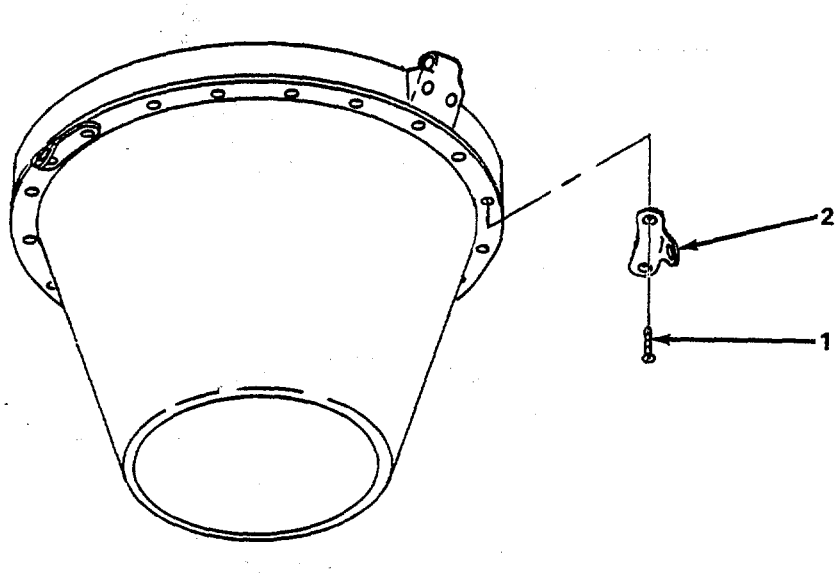


Figure 5-2. Jocking Harness Bracket, Replace.

(3) *Replace (lower breech ring retainer).* (figure 5-3)

(a) Remove 20 screws (1), three jocking harness brackets (2), lower breech ring retainer (3), and neck dam (4) (or drysuit) from breech ring (5).

(b) Install neck dam (4) (or drysuit) on breech ring (5) and secure with new lower breech ring retainer (3), three jocking harness brackets (2), and 20 screws (1). Torque screws to 18-20 in.-lb (2.1-2.3 Nm) using a staggered sequence.

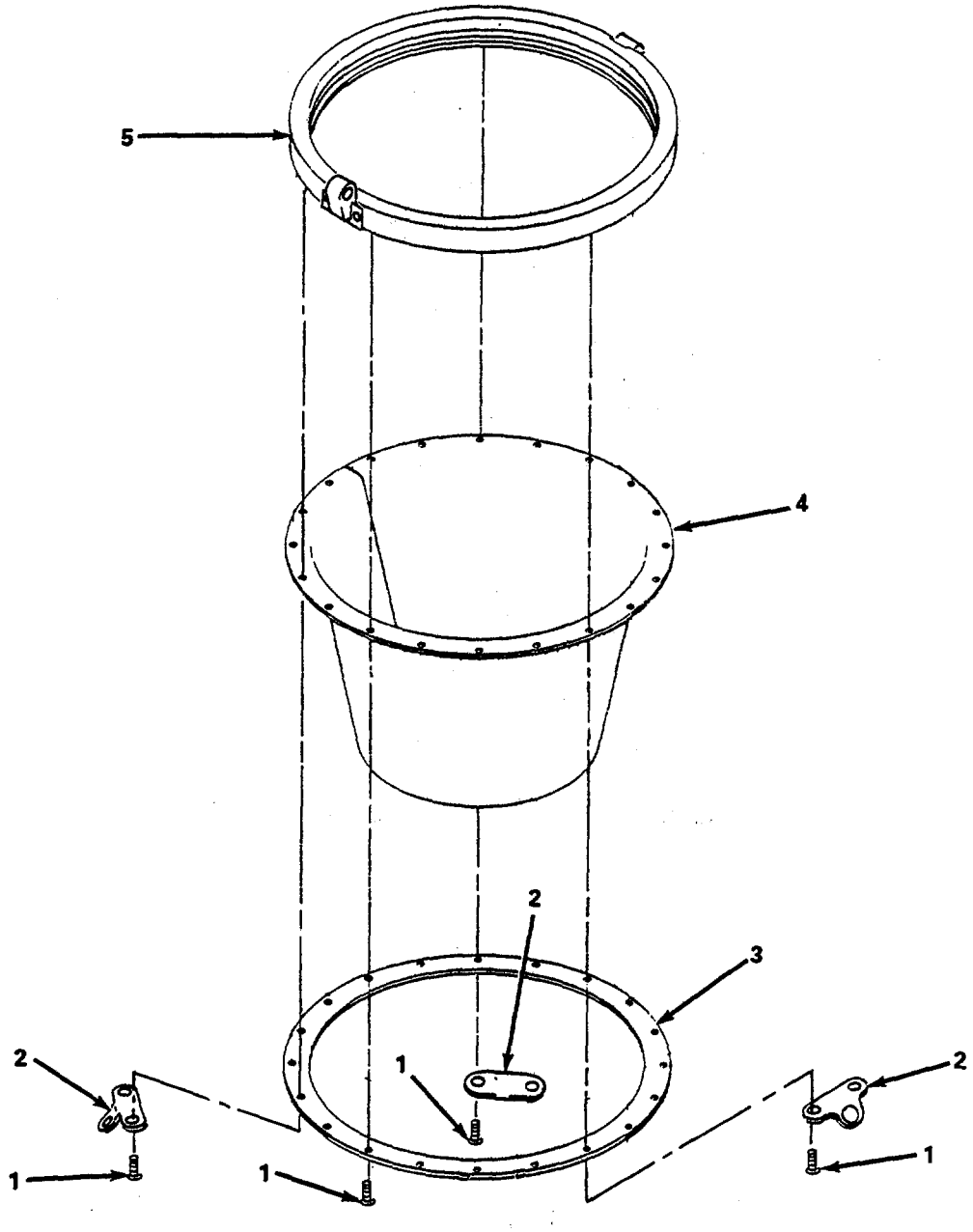


Figure 5-3. Lower Breech Ring Retainer, Replace.

5-8. Lower Breech Ring (Cont)

NOTE

The following procedure is for lower breech rings with neck dam installed only.

(4) *Replace (neckdam).* (figure 5-4).

(a) Remove 20 screws (1), three jocking harness brackets (2), lower breech ring retainer (3), and neck dam (4).

(b) Install new neck dam (4) and secure with lower breech ring retainer (3), three jocking harness brackets (2), and 20 screws (1). Torque screws to 18-20 in.-20 (2.1-2.3 Nm).

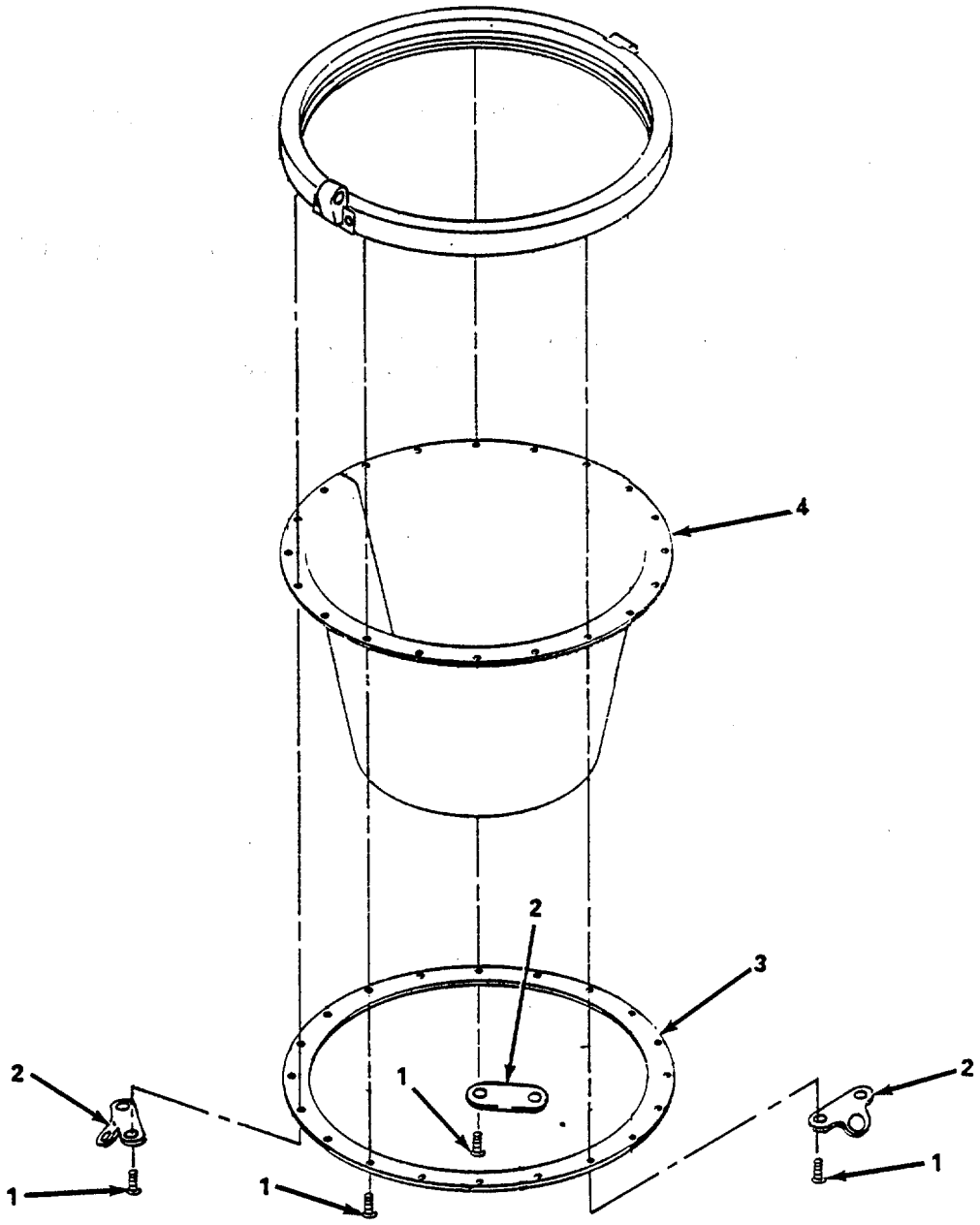


Figure 5-4. Neck Dam, Replace.

5-8. Viewport Assemblies.

This task covers:

a. Replace (front) **b. Replace (side)** **c. Replace (top)**

INITIAL SETUP

Tools	*Materials/Parts*
9/64-inch Hex Wrench (Item 22, Appendix B)	Top Viewport
0-50 lb-in. Torque Wrench (Item 14, Appendix B)	Side Viewport
Socket Wrench Adapter, (Item 41, Appendix B)	Front Viewport
Hex Insert (Item 51, Appendix B)	Halocarbon Grease 25-55 (Item 10, Appendix E)
MK12 Test Set (Item 44, Appendix B)	

a. *Replace (Front).* (figure 5-5)

(1) Remove 16 screws (1), viewport retainer (2), viewport (3) and preformed packing (4).

(2) Inspect retainer (2) and replace if rusted or cracked.

(3) Inspect helmet shell (5) around front viewport (3). Replace helmet shell (5) if cracked.

(4) Apply a thin film of lubricant to new preformed packing (4).

(5) Ensure preformed packing groove is clean.

(6) Install new preformed packing (4) in groove.

(7) Install front viewport (3) and ensure new preformed packing (4) stays in groove.

(8) Install retainer (2) and four corner screws (1) finger tight.

(9) Install remaining 12 screws (1) finger tight.

(10) Torque all screws (1) to 8-10 in.-lb (0.9-1.2 Nm) in a crisscross staggered sequence to prevent cracking or warping of viewport (3) or retainer (2).

(11) Ensure new preformed packing (4) has not extruded.

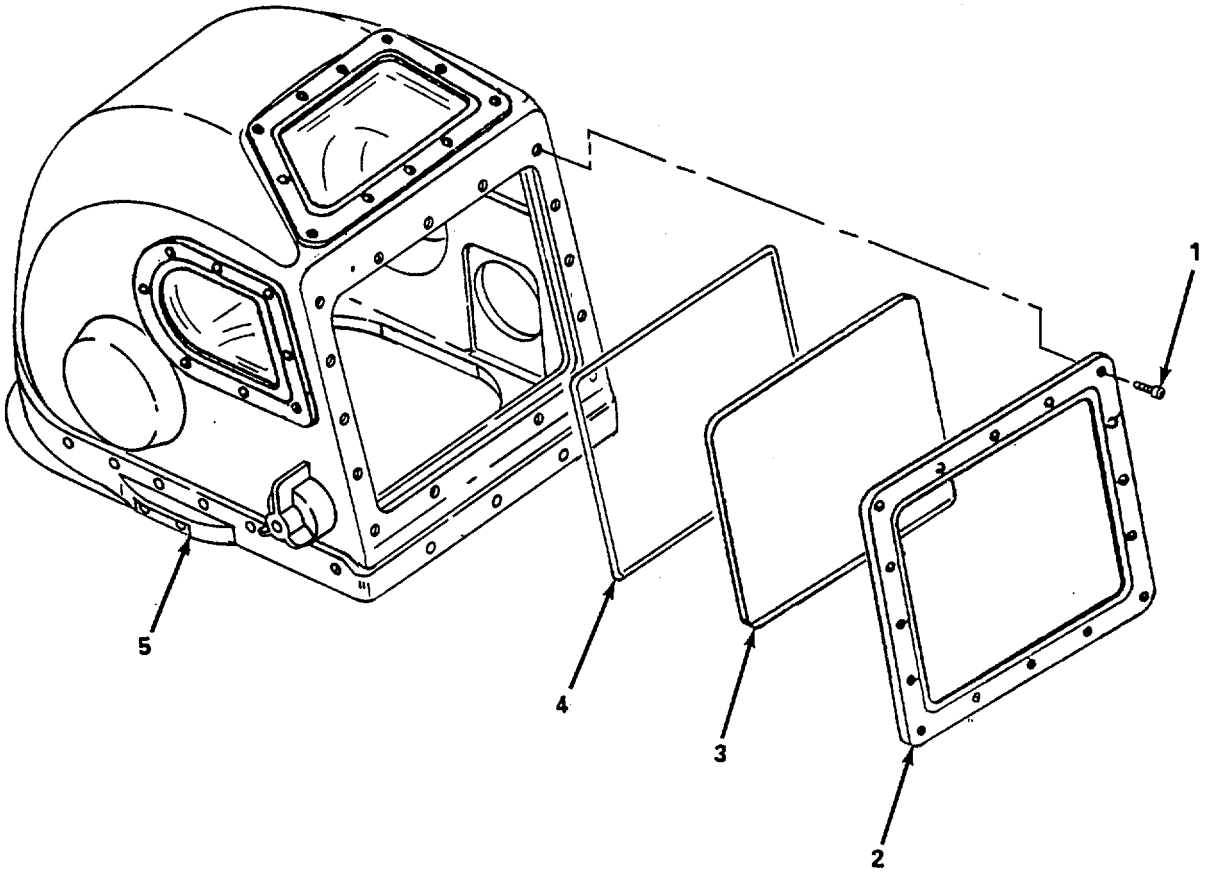


Figure 5-5. Front Viewport, Replace.

FOLLOW-ON MAINTENANCE
Leak test viewport (para. 2-8).

5-8. Viewport Assemblies (Cont).

b. *Replace (Side).* (figure 5-6)

NOTE

There is a right side viewport and a left side viewport, the procedures are the same for both.

(1) Remove eight screws (1), viewport retainer (2), viewport (3), and preformed packing (4).

(2) Inspect viewport retainer (2) and replace if cracked or warped.

(3) Inspect helmet shell (5) around viewport (3) and replace if shell is cracked.

(4) Apply a thin film of lubricant to new preformed packing (4).

(5) Ensure preformed packing groove is clean.

(6) Install new preformed packing (4) in groove.

(7) Install viewport (3) and ensure new preformed packing (4) stays in groove.

(8) Install retainer (2) and four corner screws (1) finger tight.

(9) Install remaining four screws (1) finger tight.

(10) Torque all screws (1) to 8-10 in.-lb (0.9-1.2 Nm) .

(11) Ensure new preformed packing (4) has not extruded.

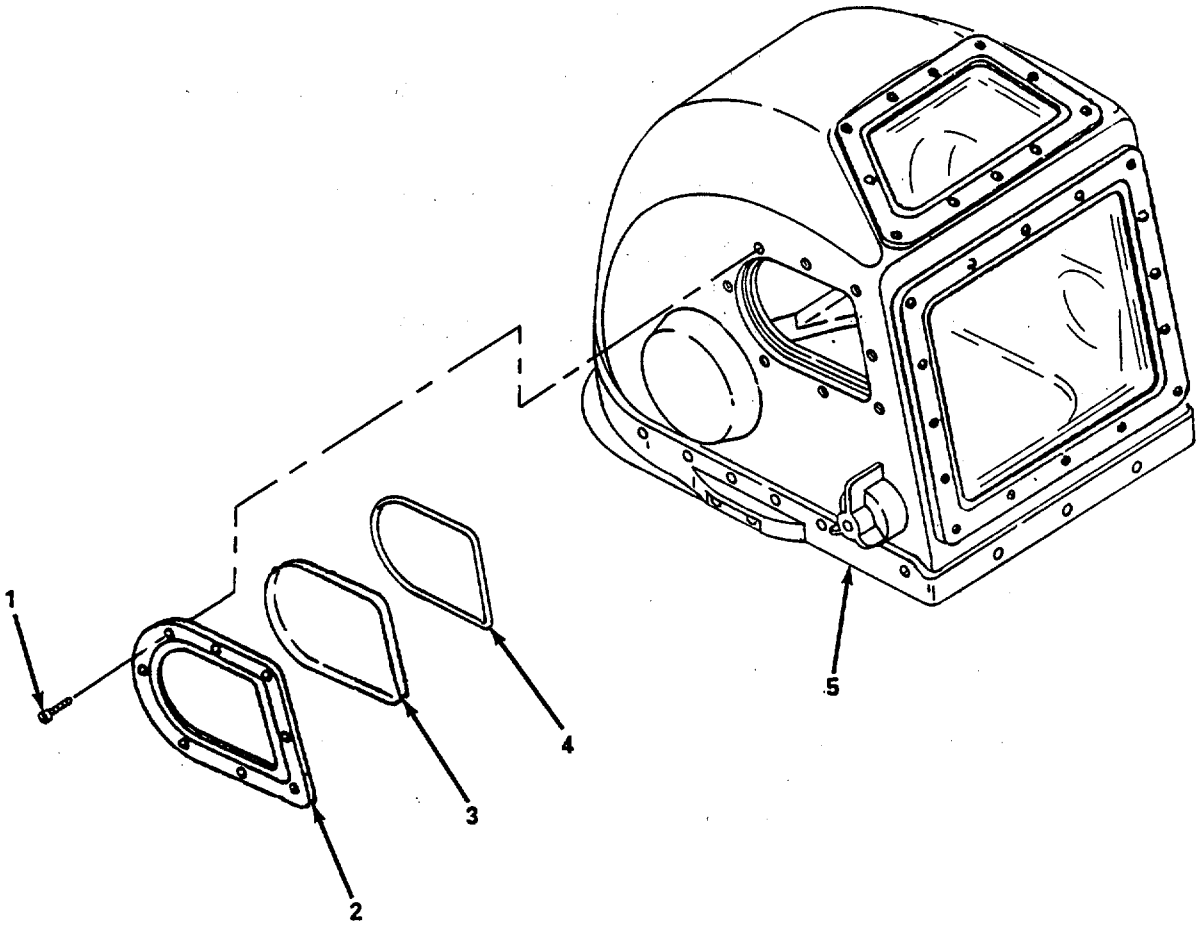


Figure 5-6. Side Viewport, Replace.

FOLLOW-ON MAINTENANCE
Leak test viewport (para. 2-8).

5-8. Viewport Assemblies (Cont).

c. *Replace (Top).* (figure 5-7)

(1) Remove 11 screws (1), viewport retainer (2), viewport (3), and preformed packing (4).

(2) Inspect retainer (2) and replace if cracked, warped, or rusted.

(3) Inspect helmet shell (5) around viewport and replace if shell is cracked.

(4) Apply a thin film of lubricant to new preformed packing (4).

(5) Ensure preformed packing groove is clean.

(6) Install new preformed packing (4).

(7) Install viewport (3) and ensure new preformedpacking (4) stays in groove.

(8) Install retainer (2) and secure with four corner screws (1) finger tight.

(9) Install remaining seven screws (1).

(10) Torque all screws (1) to 8-10 in.-lb (0.9-1.2 Nm) in a crisscross staggered sequence to prevent warping or cracking of viewport (3) or retainer (2).

(11) Ensure new preformed packing (4) has not extruded.

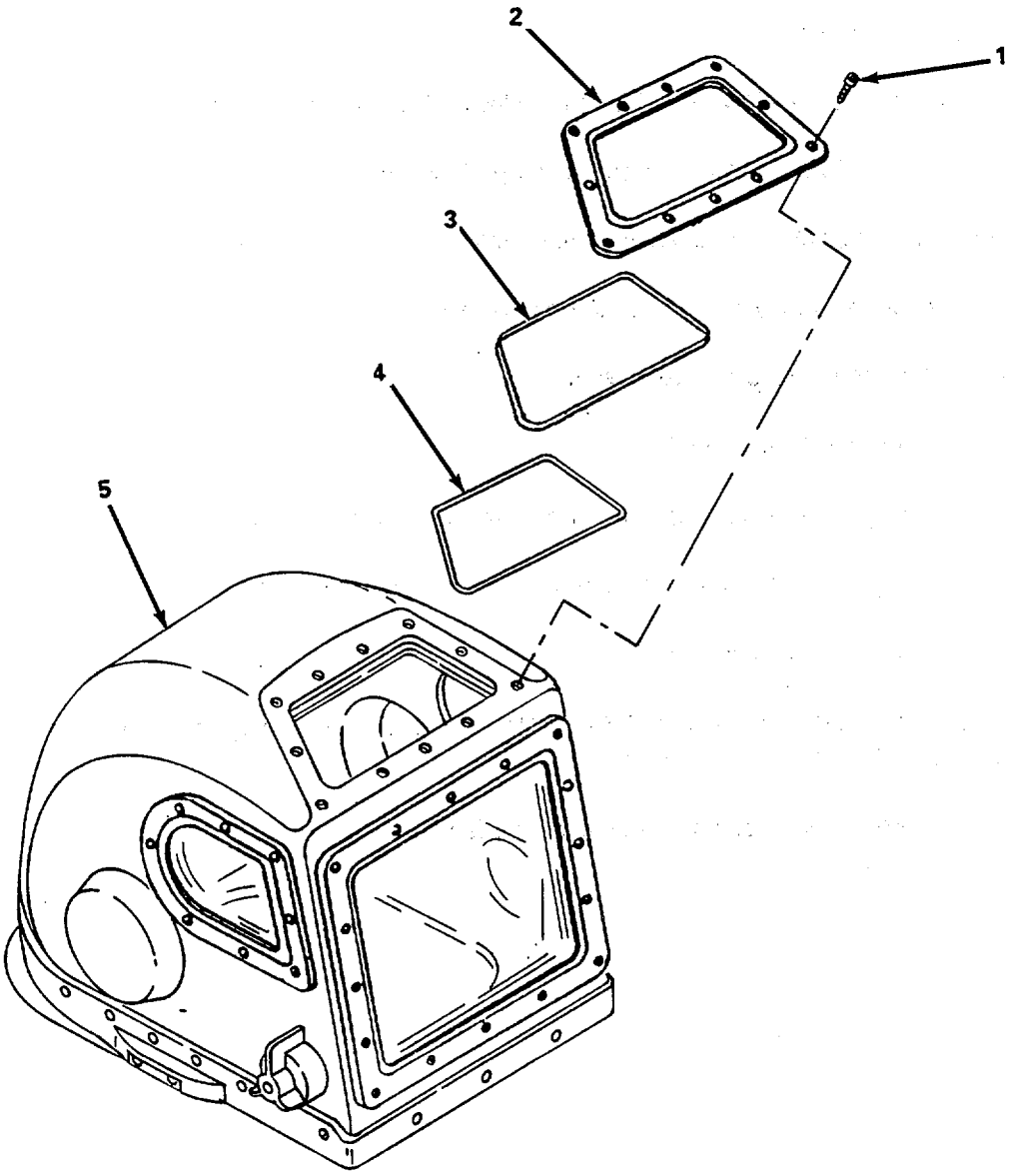


Figure 5-7. Top Viewport, Replace.

FOLLOW-ON MAINTENANCE
Leak test viewport (para. 2-8).

5-9. Air Supply Adapter.

This task covers:

Repair

INITIAL SETUP

Materials/Parts	*Equipment Condition*
Tincture-of-Green Soap (Item 17, Appendix E)	Air supply adapter removed (para. 4-19).
Cloth, Clean (Item 8, Appendix E)	
Paper, Abrasive (Item 13, Appendix E)	*Reference*
	Para. 5-6, General

Repair. (figure 5-8)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Clean air supply adapter (1) with warm soapy water.

(2) Rinse with clean warm water.

(3) Dry thoroughly.

(4) Inspect air supply adapter (1) for cracks or dents and replace if damaged.

(5) Inspect bore (2) of air supply adapter (1) and remove any slight scores or grooves with emery cloth and clean adapter thoroughly.

(6) Inspect mounting surfaces for scratches and remove minor surface imperfections with emery cloth.

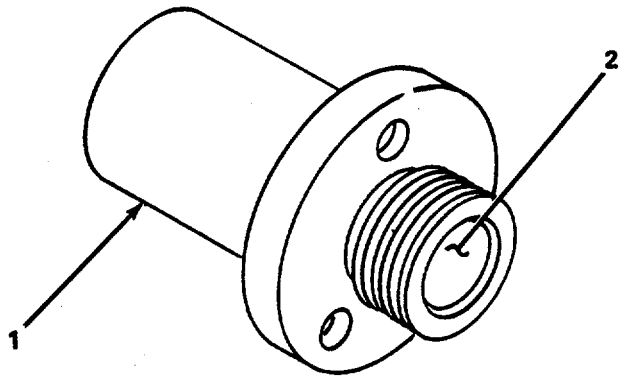


Figure 5-8. Air Supply Adapter, Repair.

FOLLOW-ON MAINTENANCE
Install air supply adapter (para. 4-19).

5-10. Air Supply Valve.

This task covers:

Repair

INITIAL SETUP

Materials/Parts	*Equipment Condition*
Tape, Teflon (Item 23, Appendix E)	Air supply valve removed (para. 4-21).
Paper, Abrasive (Item 13, Appendix E)	
Non-Ionic Detergent (NID) (Item 6, Appendix B)	*Reference*
	Para. 5-6, General

Repair. (figure 5-9)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

NOTE

The valve is partially disassembled during replace.

(1) Remove packing gland nut (1) and nut (2).

(2) Unscrew and remove valve stem (3) from valve body (4).

CAUTION

Do not remove valve packing from stem if stem has existing burrs.

(3) Remove brass washer (5), teflon packing (6) and stainless steel spacer (7).

(4) Remove relief valve (9).

(5) Clean all items with warm soapy water and rinse thoroughly.

(6) Dry all parts thoroughly.

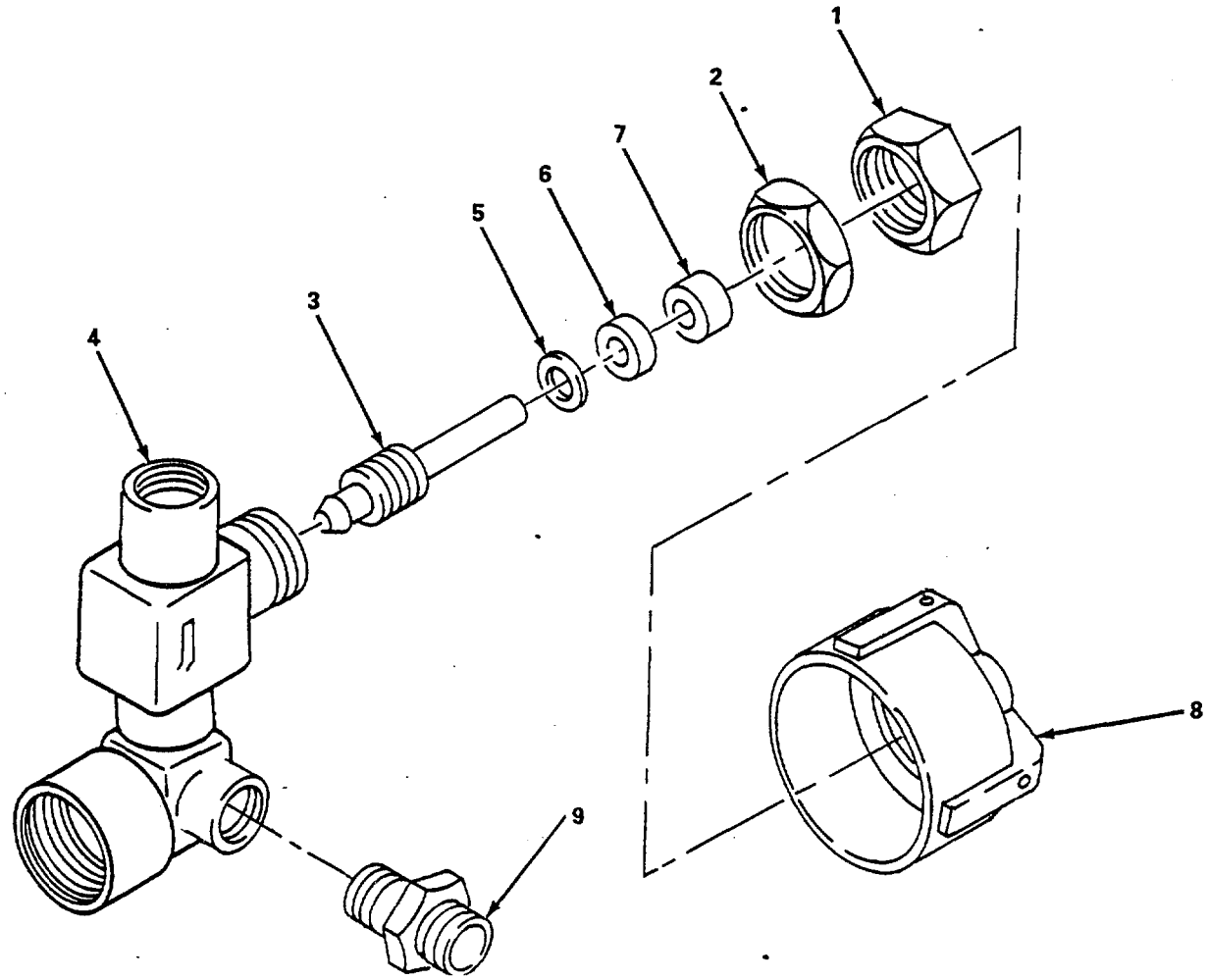


Figure 5-9. Air Supply Valve, Repair.

(7) Inspect valve assembly body (4) for corrosion, dirt, and damage, and replace as required.

(8) Inspect valve stem (3) and remove burrs with emery paper. Replace stem if too badly burred, or otherwise damaged.

(9) Inspect brass washer (5) and replace if bent, scored, or otherwise damaged.

(10) Inspect teflon packing (6) and replace if worn, bent, or otherwise damaged.

(11) Inspect stainless steel spacer (7) and replace if bent, worn, or otherwise damaged.

(12) Inspect relief valve (9) and replace if corroded or believed to be defective.

(13) Inspect handle (8) and replace if cracked, bent, or otherwise damaged.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(14) Apply teflon tape to threads on relief valve (9).

(15) Install relief valve (9).

(16) Install stainless steel spacer (7), teflon packing (6), and brass washer (5) on valve stem (3).

(17) Install valve stem (3).

(18) Install nut (2) and packing gland nut (1).

FOLLOW-ON MAINTENANCE
Install air supply valve (para. 4-21).

5-11. Diffuser Assembly.

This task covers:
Repair

INITIAL SETUP

Tools	*Equipment Condition*
Padded, Curved Jaw Pliers (Item 26, Appendix B)	Diffuser assembly removed (para. 4-22)
Materials/Parts	*Reference*
Paper, Abrasive (Item 13, Appendix E) RTV Sealant (Item 1, Appendix E) Halocarbon Grease 25-55 (Item 10, Appendix E) Non-Ionic Detergent (NID) (Item 6, Appendix E)	Para. 5-6 General

Repair. (figure 5-10)

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Remove ear clearing pad (1).

(2) Unscrew cap (2) and remove air supply diffuser (3) and 12 filter elements (4).

(3) Clean all parts with warm soapy water except filter elements (4).

(4) Rinse thoroughly with warm clean water.

(5) Dry all parts thoroughly.

(6) Replace air supply diffuser (3) if excessively dirty.

(7) Replace ear clearing pad (1) if excessively dirty.

(8) Inspect baffle tube assembly (5) and replace if bent, cracked, dented, or otherwise damaged.

(9) Inspect filter elements (4) and replace if dirty, torn, or otherwise damaged.

(10) Install 12 filter elements (4), air diffuser (3) and secure with cap (2).

(11) Install ear clearing pad (1).

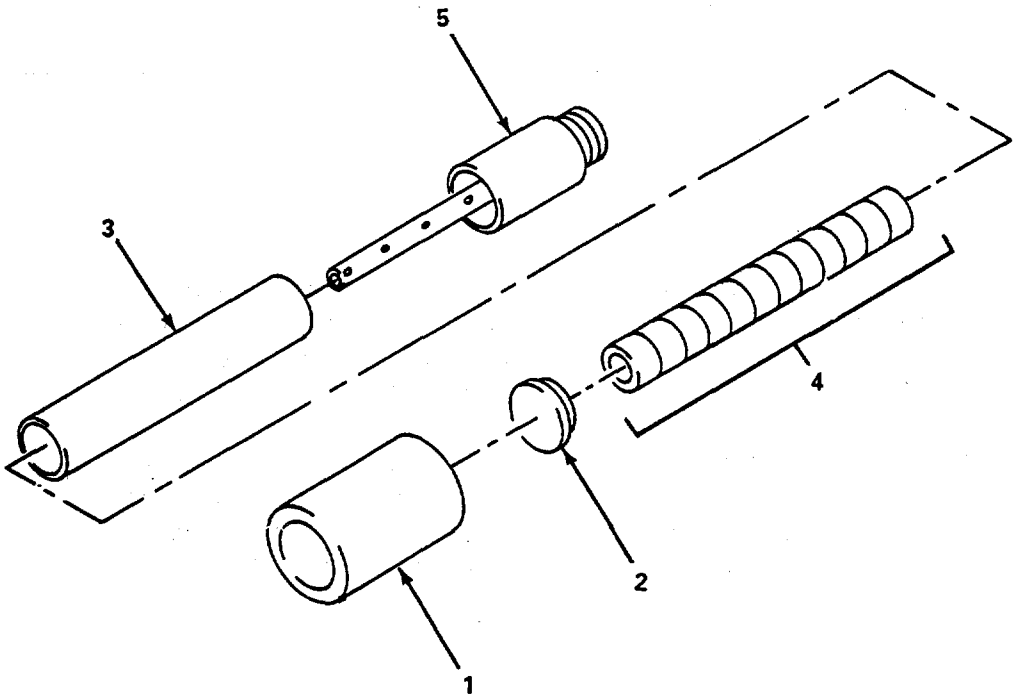


Figure 5-10. Air Diffuser Assembly, Repair.

FOLLOW-ON MAINTENANCE
Install air diffuser assembly (para. 4-22).

5-12. Communications Whip.

This task covers:

Repair

INITIAL SETUP

Tools

Soldering Gun (Item 53, Appendix B)
Wire Stripper (Item 34, Appendix B)
9/64 Hex Wrench (Item 22, Appendix B)
0-50 in.-lbs Torque Wrench (Item 14, Appendix B)
Tool Kit, Electronic (Item 57, Appendix B)

Tools (Cont)

Adapter, Socket Wrench (Item 41, Appendix B)
Hex Insert (Item 55, Appendix B)

Materials/Parts

Solder (Item 18, Appendix E)

Replace. (figure 5-11)

(1) Tag and unsolder electrical leads (1) from communications whip (2).

(2) Remove three hex screws (3) and remove communications whip (2) and preformed packing (4).

(3) Apply a thin film of lubricant to new preformed packing (4).

(4) Install new preformed packing (4) and communication whip (2) and secure with three hex head screws (3). Torque screws to 13-15 lb-in. (1.5-1.7 Nm).

(5) Solder electrical connections (1) as tagged.

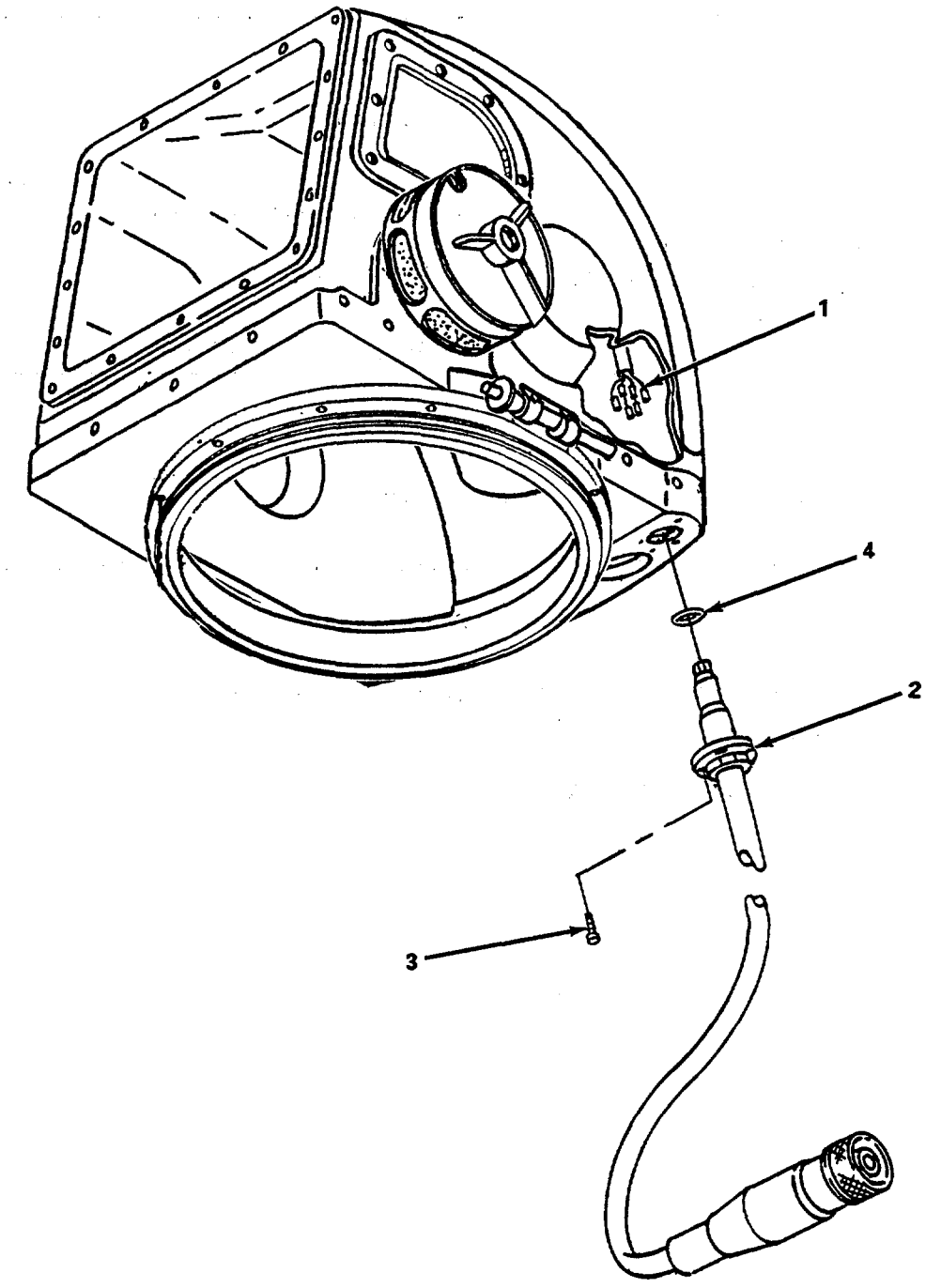


Figure 5-11. Communications Whip, Replace.

5-13. Helmet Shell.

This task covers:

Repair

INITIAL SETUP

Tools	*Equipment Condition*
5/64-inch Hex Wrench (Item 17, Appendix B)	Viewports removed (para. 5-8).
0-50 lb-in. Torque Wrench (Item 14, Appendix B)	Helmet communications assembly removed
Adapter, Socket Wrench (Item 41, Appendix B)	(para. 4-26).
	Exhaust valve removed (paras. 4-23 and 4-24).
Materials/Parts	Air supply tube removed (para. 4-20).
	Air supply valve removed (para. 4-21).
Helmet Shell	Supply duct removed (para. 4-29).
Halocarbon Grease (Item 10, Appendix E)	Return duct removed (para. 4-29).
	Diffuser assembly removed (para. 4-22).

Replace. (figure 5-12)

(1) Remove two speaker retainers (1).

(2) Remove three screws (2) and nuts (3).

(3) Remove 25 screws (4) and inserts (5) and separate base (6) from helmet shell (7).

(4) Apply a thin film of lubricant to helmet shell (7) along all the surfaces that contact the base (6).

(5) Install helmet shell (7) and secure with 25 screws (4) and threaded inserts (5) finger tight.

(6) Install three screws (2) and nuts (3) finger tight.

(7) Torque all screws to 8-10 in.-lb (0.9-1.2 Nm) in a staggered sequence.

(8) Ensure mounting surfaces on speaker retainers(1) are clean.

(9) Apply adhesive to speaker retainers (1) and install.

FOLLOW-ON MAINTENANCE
(1) Install air supply valve (para. 4-21).
(2) Install air supply tube (para. 4-20).
(3) Install exhaust valve (para. 4-23 and 4-24).
(4) Install helmet communications assembly (para. 4-26).
(5) Install viewports (para. 5-8).
(6) Install supply duct (para. 4-29).
(7) Install return duct (para. 4-29).
(8) Install diffuser assembly (para. 4-22).

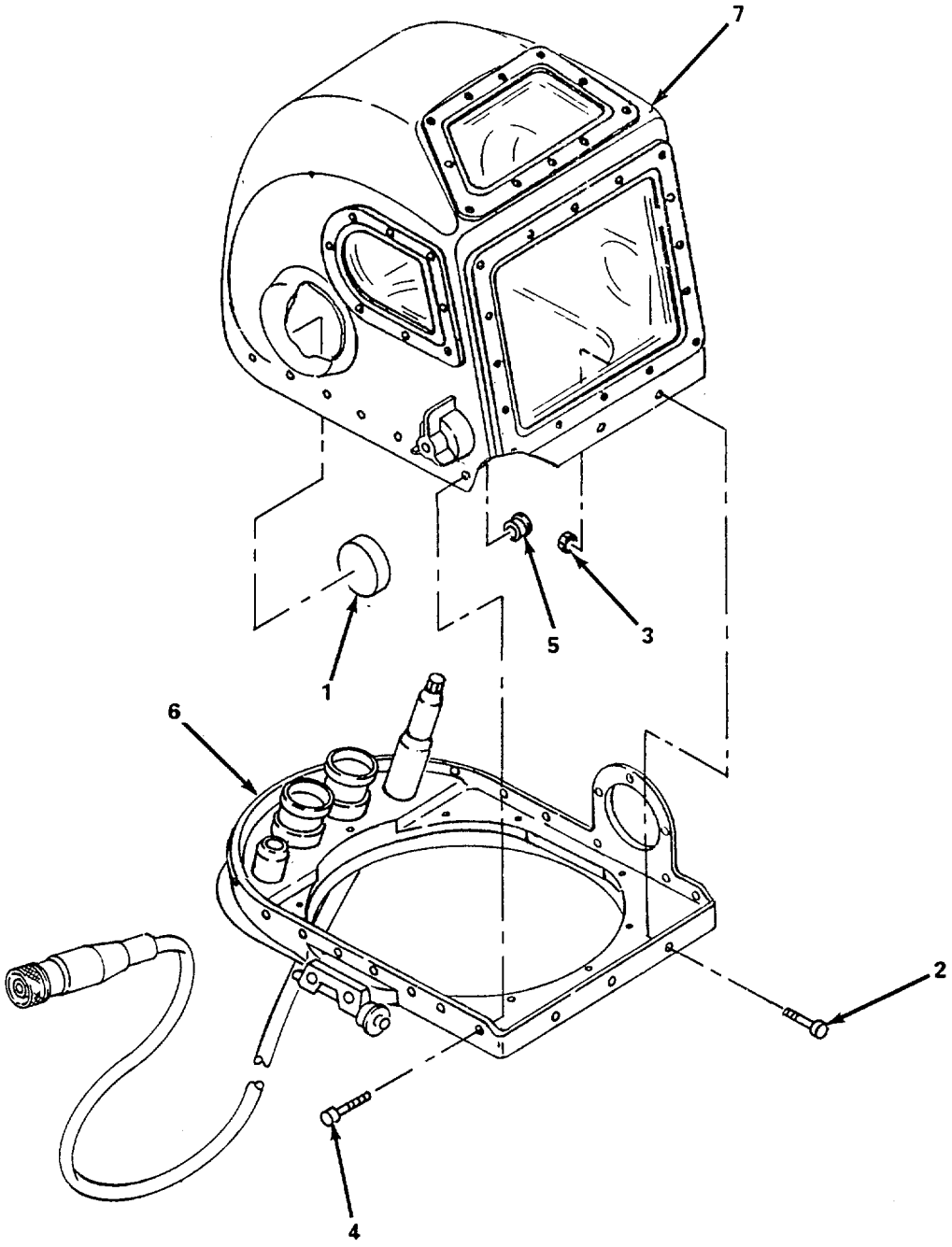


Figure 5-12. Helmet Shell, Replace.

5-14. Communications Box.

This task covers:
Repair

INITIAL SETUP

Tools	*Materials/Parts*
General Mechanic's Tool Kit (Item 47, Appendix B)	Battery Pack
Tool Kit, Electronic (Item 57, Appendix B)	Transformer
	Heat Sink Assembly
	Knob
	Spare Parts Kit

Repair.

(1) Transformer/heat sinkassembly.(figure 5-13)

(a) Remove 10 screws (1) and front panel (2) from communications box (3).

(b) Remove foam padding from connectors (4) and (5).

(c) Remove foam padding from around transformer/heat sink assembly (6).

(d) Remove transformer/heat sink assembly (6).

(e) Slide transformer/heat sink assembly (6) back into cabinet.

(f) Pack foam material around transformer/heat sink assembly (6).

(g) Connect and pack foam around connectors (4) and (5).

(h) Install front panel (2) with 10 screws (1).

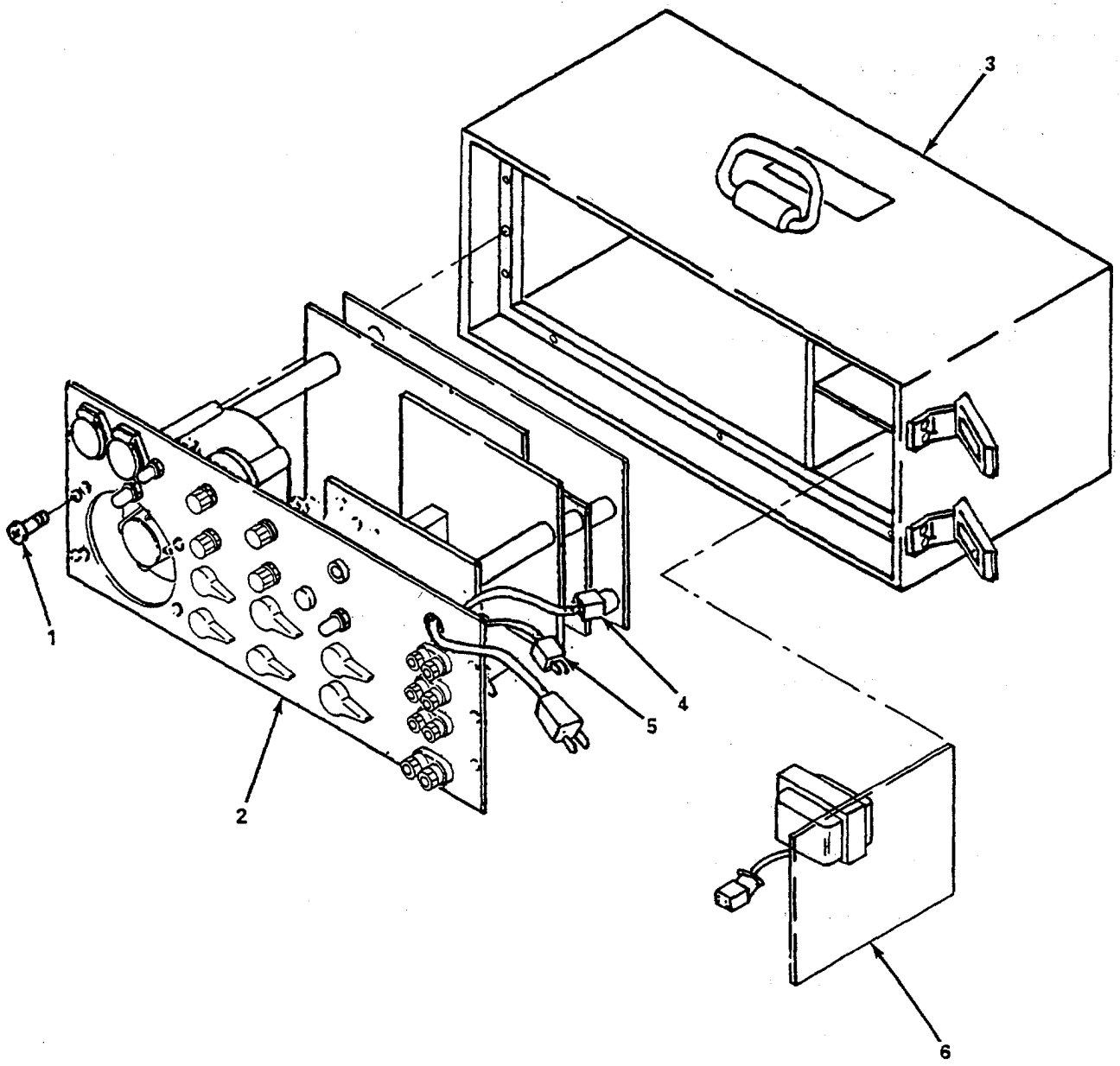


Figure 5-13. Transformer/Heat Sink Assembly, Replace.

5-14. Communications Box (Cont).

(2) *Battery pack assembly*. (figure 5-14).

(a) Transformer/heat sink assembly removed (para. 5-14(1)).

(b) Remove battery pack (1) from communication box (2).

(c) Install battery pack (1) in communication box (2).

(d) Transformer/heat sink assembly installed (para. 5-14(1)).

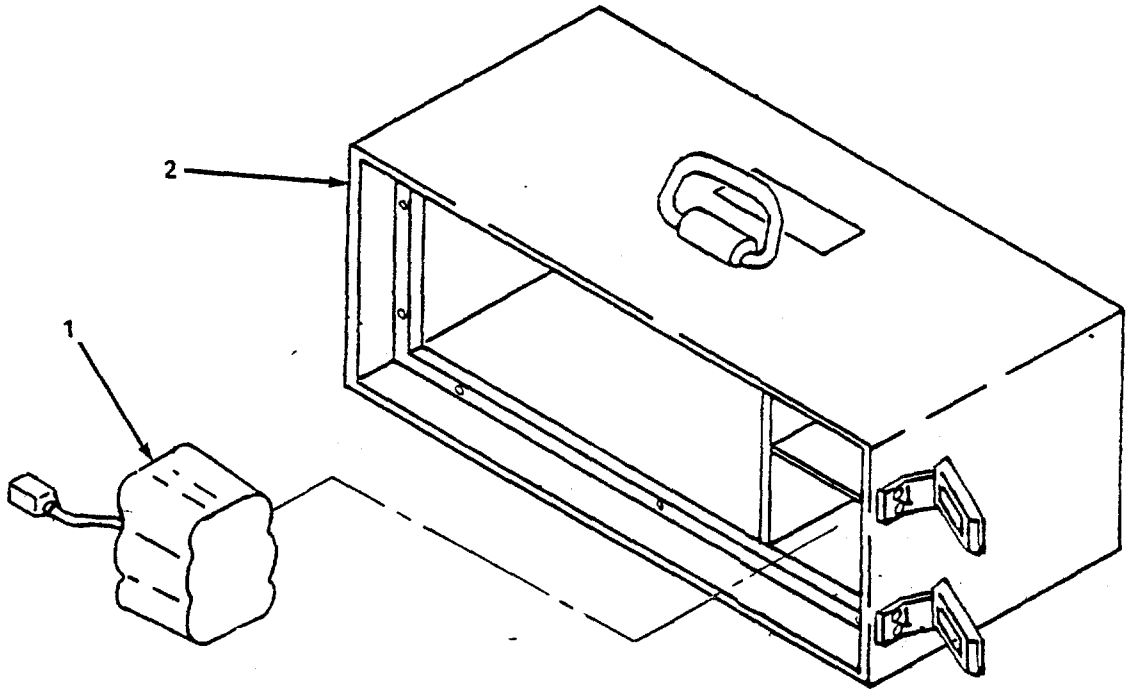


Figure 5-14. Battery Pack Assembly, Replace.

(3) *Control knob replacement*. (figure 5-15).

(a) Loosen setscrew (1).

(b) Pull knob (2) from control shaft (3).

(c) Install knob (2) on control shaft (3).

(d) Secure with setscrew (1).

(4) Model 11311 spare parts kit. The Model 11311 spare parts kit contains many miscellaneous items too numerous to list in this publication. Parts in this kit should be used on an as needed basis. Procedures for removal and installation of these parts must be determined by appropriate maintenance facility.

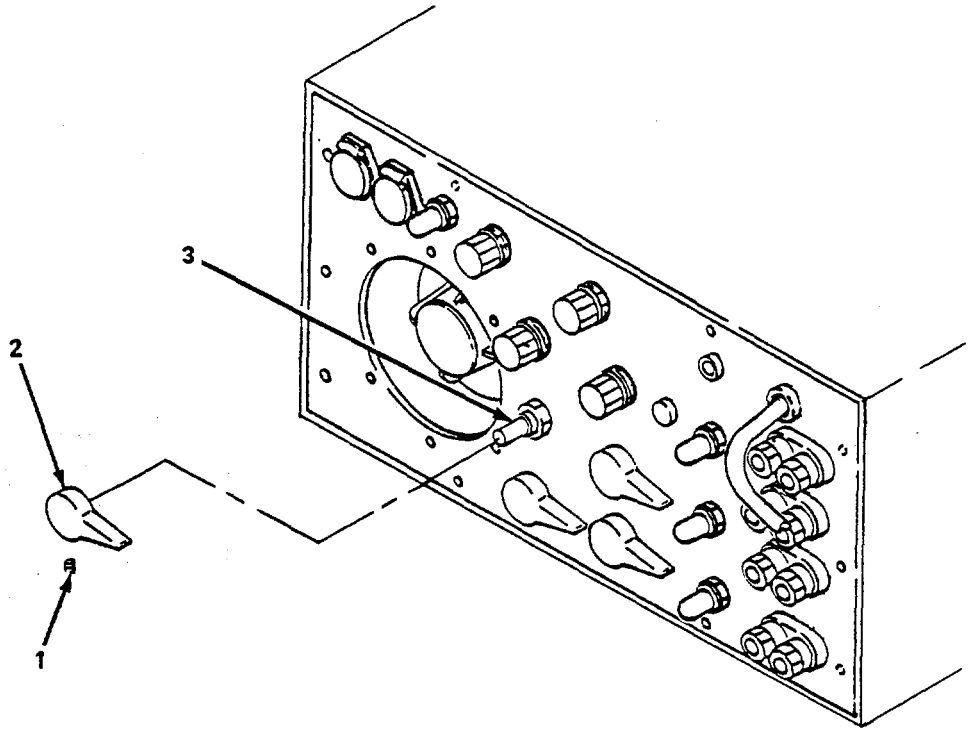


Figure 5-15. Control Knob, Replace.

5-14. Communications Box (Cont).

(5) Replace speaker. (figures 5-16, 5-17, and 5-18).

(a) Remove necessary screws, spacers, washers, and boards to access speaker.

(b) Identify wires for reassembly.

(c) Remove speaker.

(d) Install speaker and connect wires.

(e) Install boards, spacers, washers and screws.

(6) Replace press-to-talk and press-to-cross connect switches. (figures 5-16, 5-17, and 5-18).

NOTE

Replacement of the press-to-talk switches and press-to-cross connect switches are the same.

(a) Remove circuit boards to expose switches.

(b) Remove and identify wires for reassembly.

(c) Remove knob (para. 5-14(3)).

(d) Remove switch.

(e) Install switch.

(f) Install knob (para. 5-14(3)).

(g) Install circuit boards.

(7) Replace switches S9 and S10. (figures 5-16, 5-17, and 5-18).

(a) Remove and identify wires for reassembly.

(b) Remove knob (para. 5-14(3)) (for switch S10 only).

(c) Remove switch.

(d) Install switch.

(e) Install knob (para. 5-14(3)) (for switch S10 only).

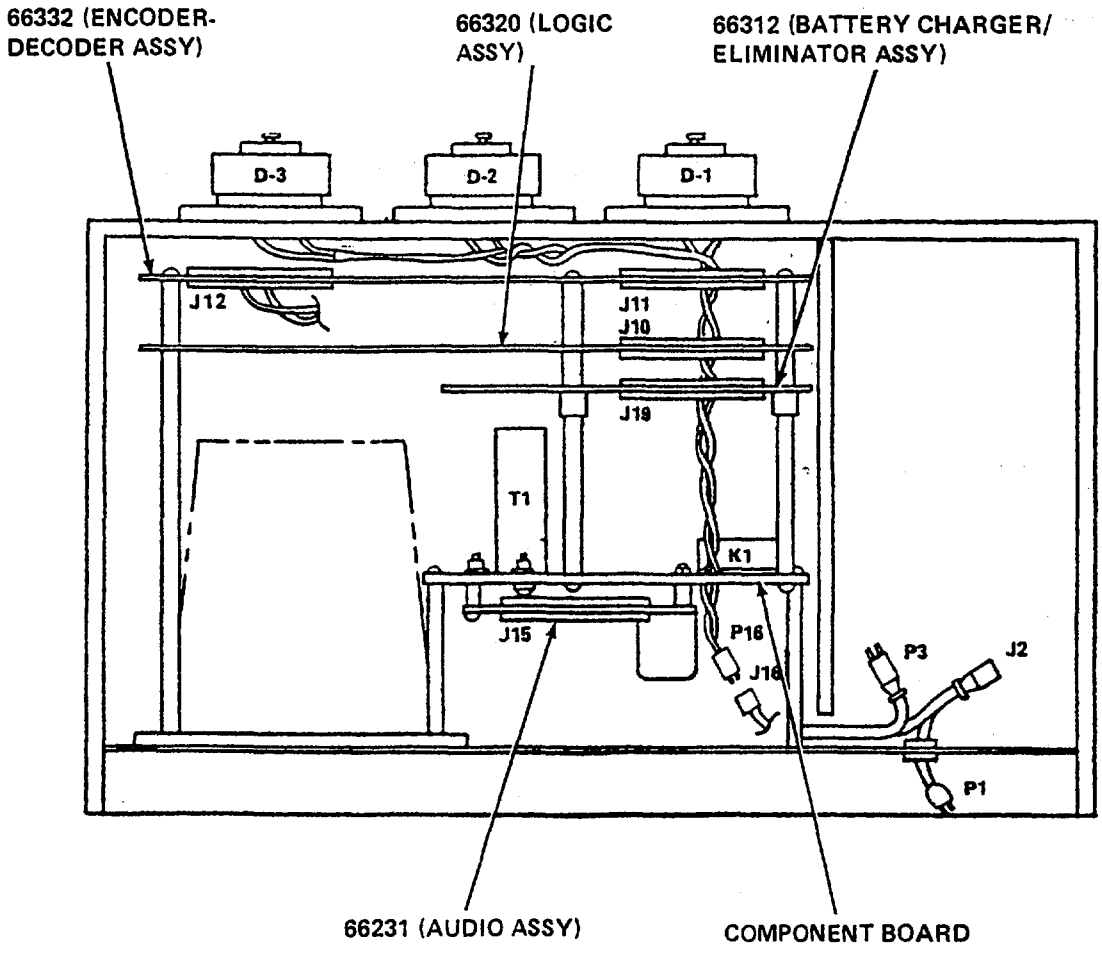


Figure 5-16. Printed Circuit Assembly Layout.

5-14. Communications Box (Cont).

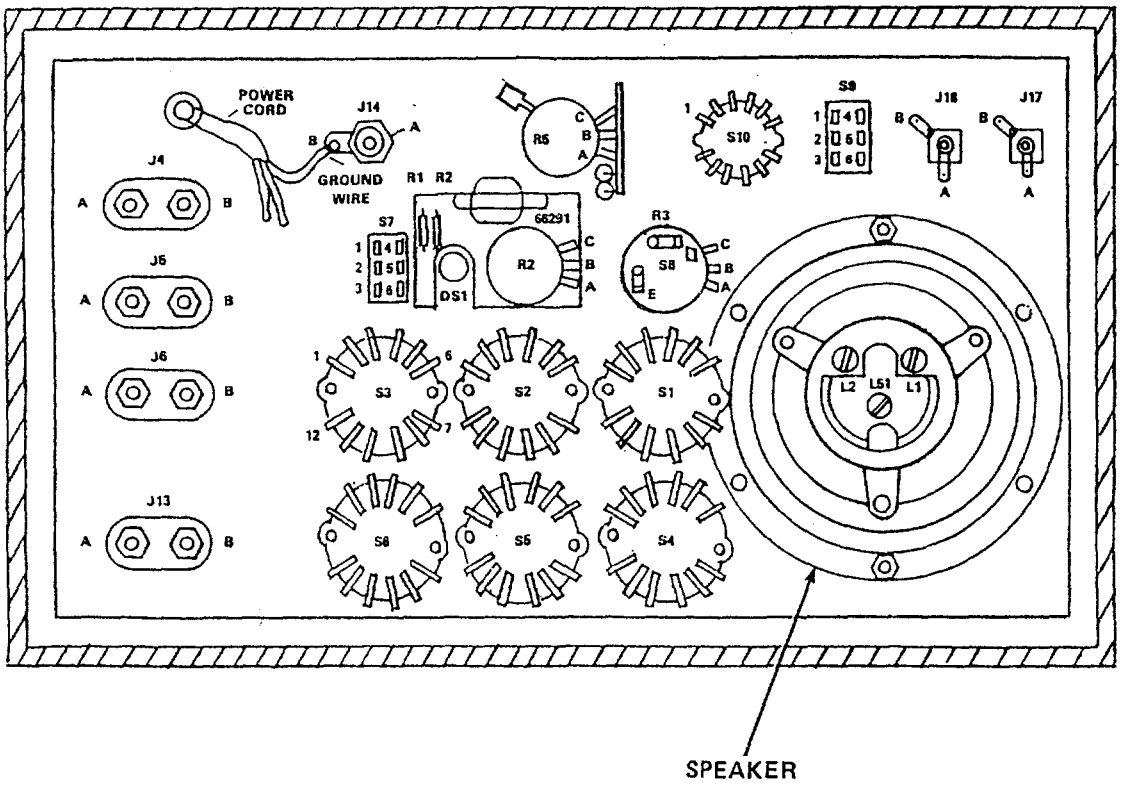
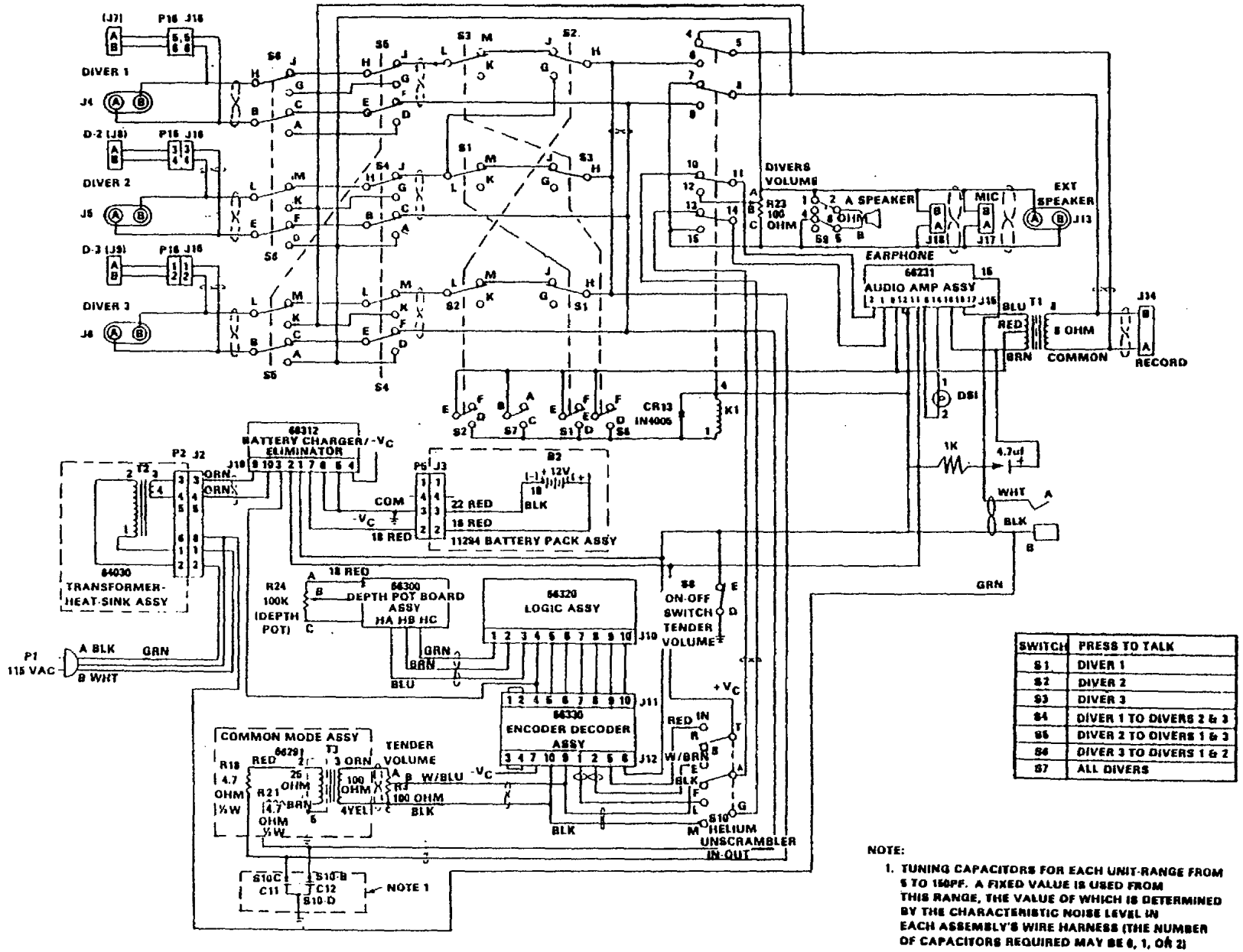


Figure 5-17. Interior Front Panel View.



SWITCH	PRESS TO TALK
S1	DIVER 1
S2	DIVER 2
S3	DIVER 3
S4	DIVER 1 TO DIVERS 2 & 3
S5	DIVER 2 TO DIVERS 1 & 3
S6	DIVER 3 TO DIVERS 1 & 2
S7	ALL DIVERS

NOTE:

1. TUNING CAPACITORS FOR EACH UNIT-RANGE FROM 5 TO 150PF. A FIXED VALUE IS USED FROM THIS RANGE, THE VALUE OF WHICH IS DETERMINED BY THE CHARACTERISTIC NOISE LEVEL IN EACH ASSEMBLY'S WIRE HARNESS (THE NUMBER OF CAPACITORS REQUIRED MAY BE 0, 1, OR 2)

Figure 5-18. System Electrical Schematic.

5-14. Communications Box (Cont).

(8) *Replace R3 potentiometer*. (figures 5-16, 5-17, and 5-18).

(a) Remove knob (para. 5-14(3)) and mounting hardware.

(b) Remove and identify wires for reassembly.

(c) Remove potentiometer.

(d) Install potentiometer.

(e) Solder wires to potentiometer.

(f) Install knob (para. 5-14(3)) and mounting hardware.

(9) *Replace K1 relay*. (figures 5-16, 5-17, and 5-18).

(a) Remove relay.

(b) Identify wires for reassembly.

(c) Remove wires.

(d) Attach wires to new relay.

(e) Attach relay to component board.

(10) *Replace common mode assembly (66291)*. (figures 5-16, 5-17, and 5-18).

(a) Remove setscrew and knob.

(b) Remove nut seal securing relay switch R2 to front panel.

(c) Gently slide common mode assembly up and out.

(d) Identify wires for reassembly.

(e) Remove wires.

(f) Solder wires.

(g) Slide new common mode assembly into position on relay switch R2.

(h) Tighten nut seal.

(i) Install knob with setscrew.

(11) *Replace audio amplifier assembly (J15*). (figures 5-16, 5-17, and 5-18).

(a) Remove six screws from front panel.

(b) Disconnect wire connector.

(c) Remove four screws, spacers and nuts.

(d) Remove audio amplifier assembly.

(e) Install audio amplifier assembly with four screws, spacers, and nuts.

(f) Connect wire connector.

(g) Install front panel with six screws.

CHAPTER 6
GENERAL SUPPORT MAINTENANCE

OVERVIEW

This chapter contains information for troubleshooting and maintenance of the MK12 SSDS by general support maintenance personnel.

SECTION I. REPAIR PARTS; SPECIAL TOOLS; TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

6-1. **Common Tools and Equipment**. For authorized common tools and equipment, refer to the Modified Table of Organization and equipment (MTOE) applicable to your unit.

6-2. **Special Tools, TMDE, and Support Equipment**. Refer to RPSTL and the Maintenance Allocation Chart pertaining to general support maintenance.

6-3. **Repair Parts**. Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 5-4220-225-24P for this equipment.

SECTION II. GENERAL SUPPORT TROUBLESHOOTING

This section is not applicable

SECTION III. GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

6-4. **General**. This section contains general support maintenance procedures as authorized by the maintenance allocation chart, Appendix B, of this manual. Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust or other contamination in accordance with Chapter 4, Section VII of this manual.

6-5. Umbilical.

This task covers:

a. Test **b. Repair**

INITIAL SETUP:

Tools

13001 Band-it Tool (Item 32, Appendix B)
Knife (Item 38, Appendix B)
Tool Kit, Electronic (Item 57, Appendix B)
Pliers (Item 35, Appendix B)
Screwdriver, Flat-Tip (Item,30, Appendix B)
Hacksaw (Item 50, Appendix B)
Wire Stripper (Item 34, Appendix B)
Adapter, Band-it (Item 33, Appendix B)
Vise (Item 58, Appendix B)
General Mechanics Tool Box (Item 47, Appendix B)
Torque Wrench, 0-50 in.-lb (Item 14, Appendix B)

Materials/Parts

82A Power Cable Splice Kit
Gates 33HB/3/8- and 1/2-inch Hose
1/4-inch M.I.D. Pneumofathometer Hose
Communications/Strength Cable
Band-it Clamps (Item x, Appendix E)
Male/Female Air Connectors
Elbow Connector Assembly
Pin Connector Assembly
Polyken No. 827 Tape (Item 21, Appendix E)

Reference

Para. 6-4 General

a. Test.

WARNING

Cleanliness is imperative in maintaining and handling diving system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) *Air hose burst test*.

WARNING

- Clear area before conducting test to avoid injury to personnel.
- Ensure all air has been removed from hose before conducting test.

NOTE

This test not conducted until five years of age and then every year there after until failure.

(a) Randomly select one length of hose from each lot of hose on board. A lot is defined as all hose with same date of manufacture.

(b) Cut a 36 inch test specimen from each length selection.

(c) Install 0-5000 psi pressure gage in supply line of hydrostatic pressure source.

(d) Connect one end of test specimen to hydrostatic pressure source.

(e) Purge specimen of air.

(f) Seal open end of specimen.

(g) Lay specimen out straight on a flat surface.

(h) Observe pressure gage; increase hydrostatic pressure SLOWLY until specimen bursts; secure hydrostatic pressure.

NOTE

- Minimum acceptable burst pressure is 2400 psi.
- If specimen fails burst test, each hose bearing the same date is to be removed from diving service.
- If specimen passes burst test, each hose from the same lot and the unburst tested section of specimen hose may be continued in service until the next annual testing period.

(i) Remove specimen from hydrostatic pressure source.

(j) Remove pressure gage.

(k) Reinstall coupling and new clamps on unburst tested section of specimen hose if specimen passes burst test.

1 Roughen cut end of hose with sandpaper.

2 Coat roughened end surfaces with rubber element.

(2) *Air hose coupling pull test*.

(a) The air supply whip should be tested at least once every three years from the date of manufacture.

(b) Note the date of manufacture, if hose is more than 10 years old, remove the hose from service immediately and replace it.

(c) Inspect the hose for loose or stripped couplings,deterioration of hose, abrasions, soft spots, cuts or tears. Replace hose if damaged.

CAUTION

Care must be taken not to damage the hose. Grip on the hose should be made about one foot back from the couplings with a Kellems support grip.

(d) Subject air supply whip to an internal hydrostatic pressure of 600 psig (4137 Kpa) and a concurrent axial tensile load of 250 lbs (113.6 Kg).

(e) If the air supply whip passes both the visual and hydrostatic test then return the air supply whip to service.

(f) Replace any air supply whip which does not meet the test requirements.

(3) *Air supply whip/coupling pull test*.

(a) The air supply whip should be tested at least once every three years from the date of manufacture.

(b) Note the date of manufacture, if hose is more than 10 years old, remove the hose from service immediately and replace it.

(c) Inspect the hose for loose or stripped couplings, deterioration of hose, abrasions, soft spots, cuts or tears. Replace hose if damaged.

CAUTION

Care must be taken not to damage the hose. Grip on the hose should be made about one foot back from the couplings with a Kellems support grip.

(d) Subject air supply whip to an internal hydrostatic pressure of 600 psig (4137 Kpa) and a concurrent axial tensile load of 250 lbs (113.6 Kg).

(e) If the air supply whip passes both the visual and hydrostatic test then return the air supply whip to service.

(f) Replace any air supply whip which does not meet the test requirements.

(4) *Pneumofathometer hose pressure and leak test*.

WARNING

- Clear area before conducting test to avoid injury to personnel.
- Ensure all air has been removed from hose before conducting test.

NOTE

Any hose that leaks or exhibits excessive bulging shall be removed from service.

(a) Fill hose with clean, fresh water.

(b) Seal open end of hose.

(c) Install test tee and hydrostatic pump or pressure source.

(d) Subject hose to a pressure of 700 psig.

(e) Release pressure from hose.

(f) Disconnect hydrostatic pump (or pressure source) test tee and seal.

(g) Drain water from hose.

(h) Bleed down hose with air until dry.

(i) Discard hose that fails this test.

(j) Record test results in accordance with accepted TAMMS procedures and install metal tag on hose with testing activity, date tested, test pressure, and working pressure.

6-5. Umbilical (Cont).

b. Repair.

NOTE

The following procedures apply to both 300 and 600 foot, 3/8 and 1/2-inch air hose.

(1) *Air supply hose*. (figure 6-1)

(a) Ensure that hose ends are squarely cut, clean, and free of any foreign matter.

(b) Place three clamps (1) over the end of the hose (2), alternating their position.

(c) Insert an extra-long-gland female connector (3) into the diver's end of the air supply hose (2).

(d) Move the clamps (1) toward the connector (3) until they are evenly spaced over the gland, 1/2-inch from the end of the hose and 1/2-inch between clamps.

(e) Tighten the clamps until the connector is securely captured within the hose.

(f) Repeat steps (a) through (e) for surface end and substituting an extra-long-gland male connector (4).

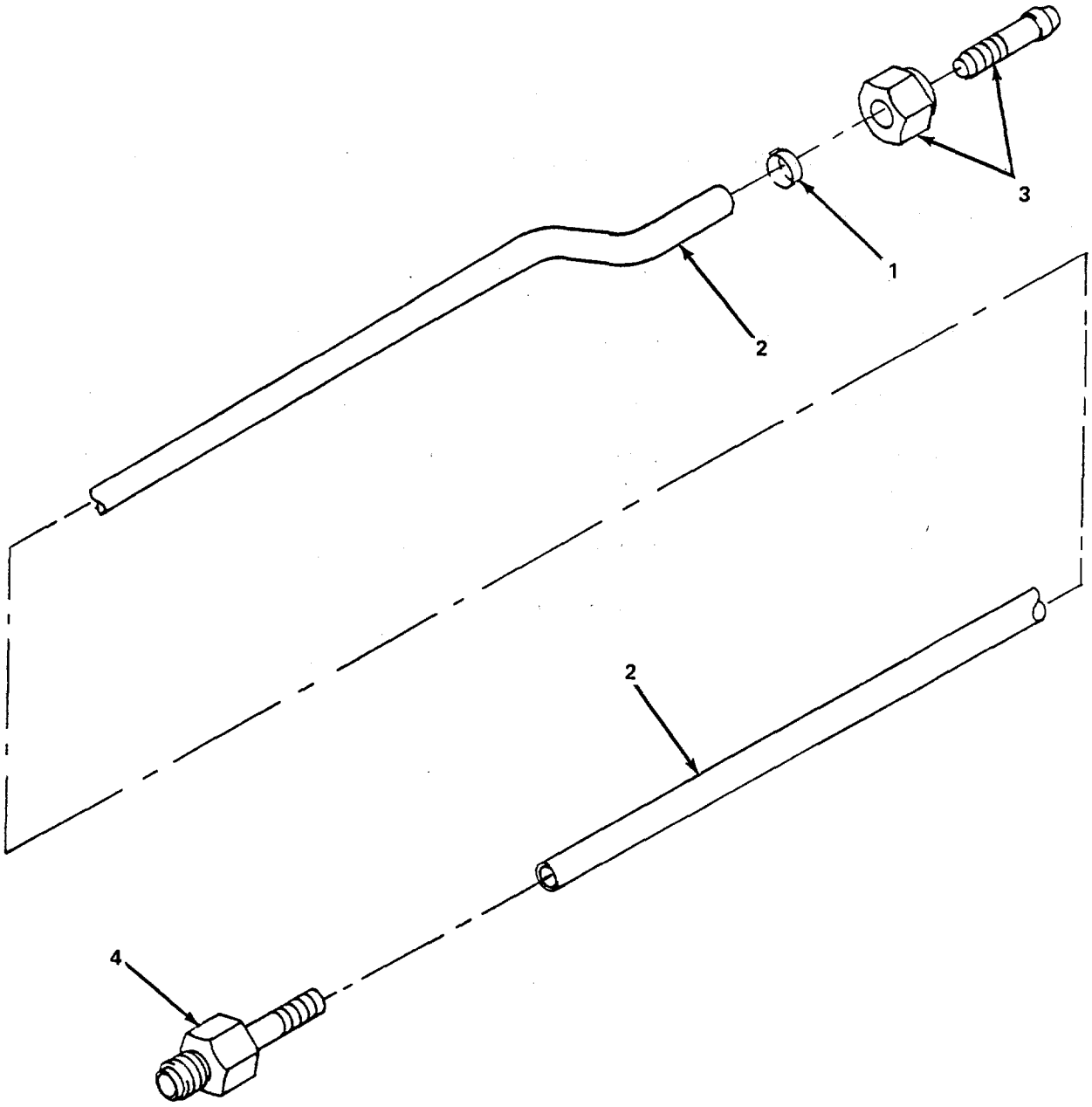


Figure 6-1. Air Supply Hose, Fabrication.

6-5. Umbilical (Cont).

(2) *Pneumofathometer hose*. (figure 6-2)

NOTE

Both the diver and surface ends of the hose require female connectors.

(a) Ensure that the hose ends are squarely cut, clean, and free of any foreign matter.

(b) Place two clamps (1) over the end of the hose (2), alternating their position.

(c) Insert an extra-long-gland, female connector (3) into the end of the pneumofathometer hose.

(d) Move the clamps toward the connector until they are evenly spaced over the gland, 1/4-inch from the end of the hose and 1/4-inch between clamps.

(e) Tighten the clamps until the connector is securely captured within the hose.

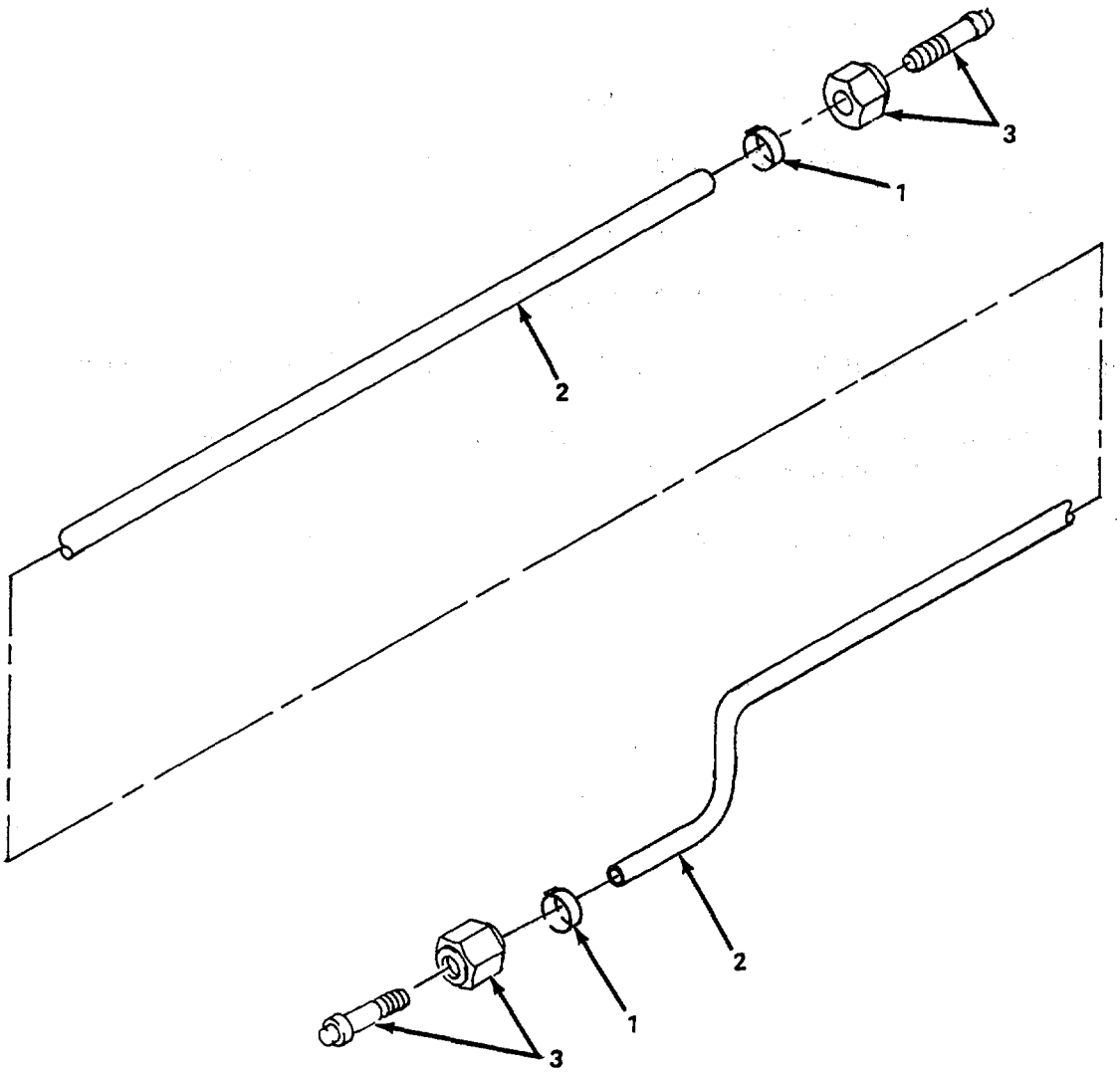


Figure 6-2. Pneumofathometer Hose, Fabrication.

6-5. Umbilical (Cont).

(3) *Communications/strength cable*. (figure 6-3)

(a) Cut end of communication cable (1) squarely.

(b) Install boot assembly (2) and slide down communications cable (1) out of way.

NOTE

Do not cut through the kevlar braid.

(c) Make four equally spaced 6 in. (152.4 mm) vertical cuts through outer jacket of communications cable (1).

(d) Peel strips of outer jacket (3) away from kevlar braid (4) and remove four outer jacket strips.

(e) Fold back kevlar braid (4) to expose inner polyurethane jacket (5).

(f) Place cable (1) in cable chuck and install in vice.

(g) Cut through inner polyurethane jacket (5) as close to kevlar braid (4) as possible, and remove jacket (5).

(h) Pull kevlar braid (4) up around wire bundle (6), twist and tape end.

(i) Slide support tube (7) over kevlar braid (4) and down to outer jacket (3).

(j) Install support tube installation tool over kevlar braid (4).

(k) Hold kevlar braid (4) through hole in installation tool to prevent bunching.

(l) Drive support tube (7) 1 1/4 in. (31.75 mm) between outer jacket (3) and kevlar braid (4). Approximately 1/4 in. (6.35 mm) of support tube (7) will be visible above outer jacket (3).

(m) Trim outer jacket (3) evenly.

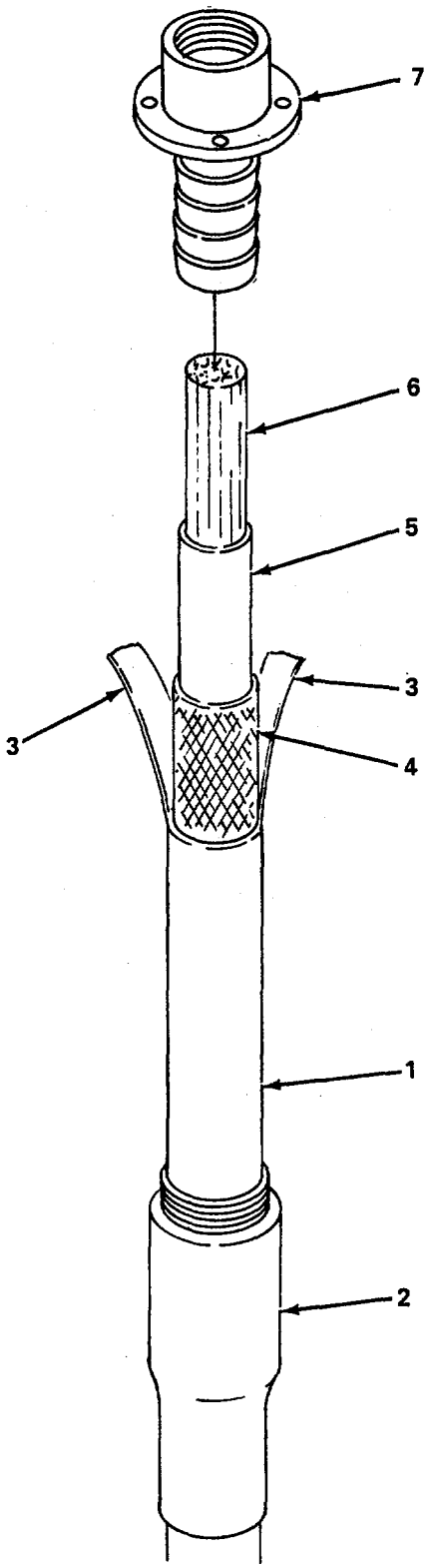


Figure 6-3. Communications Cable, Fabrication (Sheet 1 of 6).

6-5. Umbilical (Cont).

(n) Slide boot assembly (2) as far up support tube (7) as possible.

(o) Install boot pulling tool over kevlar braid (4) and thread into boot assembly (2).

(p) Tighten boot pulley tool until boot assembly (2) is completely seated against support tube (7).

(q) Fold kevlar braid (4) down over support tube (7).

(r) Install wedge (8) over wire bundle (6).

(s) Place wedge installation tube over wire bundle (6).

(t) While holding kevlar braid (4) back, tightly drive wedge (8) between kevlar braid (4) and wire bundle (6) and into support tube (7). Remove wedge installation tube and pull kevlar braid (4) up and tape.

(u) Install mechanical termination nut (9) over communication cable (1) and screw into support tube (7).

(v) Torque nut (9) to 50 in.-lb (5.65 Nm).

(w) Cut kevlar braid (4) off at nut (9).

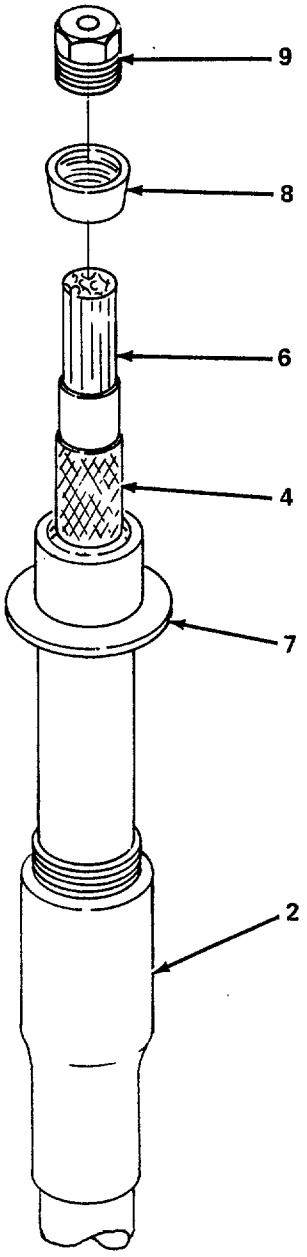


Figure 6-3. Communications Cable, Fabrication (Sheet 2 of 6).

6-5. Umbilical (Cont).

(x) Remove cellophane cable filter and separate wires as follows: two twisted shielded pairs (one white one black) in black shielding and one in white (both pairs wrapped in shielded woven wire), two twisted sets of three wires (one white, one black and the other red or green), and four single wires, one black, one white, one green, and one red.

(y) Check red-white-black triple wire for continuity. If these wires do not check out check the green-white-black set.

(z) Cut off the set of wires that will not be used along with the four single wires.

(aa) Unbraid the shielded woven wire and solder to one of the spacer tubes (10).

(ab) Install pin connector boot (11) over cable wires.

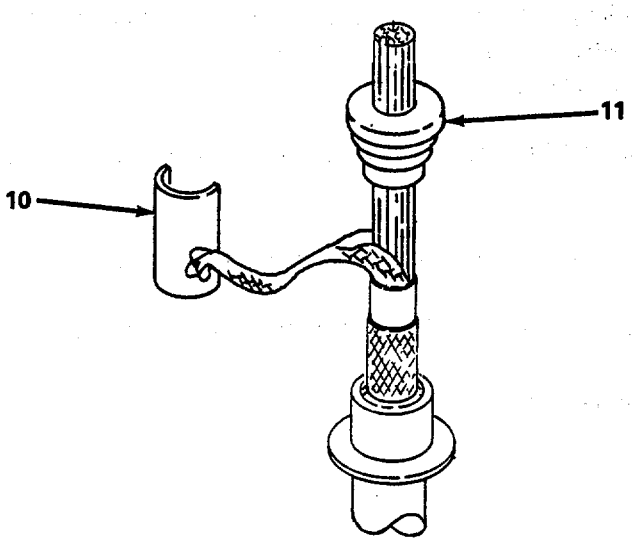


Figure 6-3. Communications Cable, Fabrication (Sheet 3 of 6).

6-5. Umbilical (Cont).

(ac) Solder seven wires to seven pin connectors as follows:

Pin 1 black wire from white shielded pair
Pin 2 white wire from black shielded pair
Pin 3 black wire from red-white-black group
Pin 4 white wire from red-white-black group
Pin 5 black from black shielded pair
Pin 6 white from white shielded pair
Pin 7 red from red-white-black group

TM 5-4220-225-14

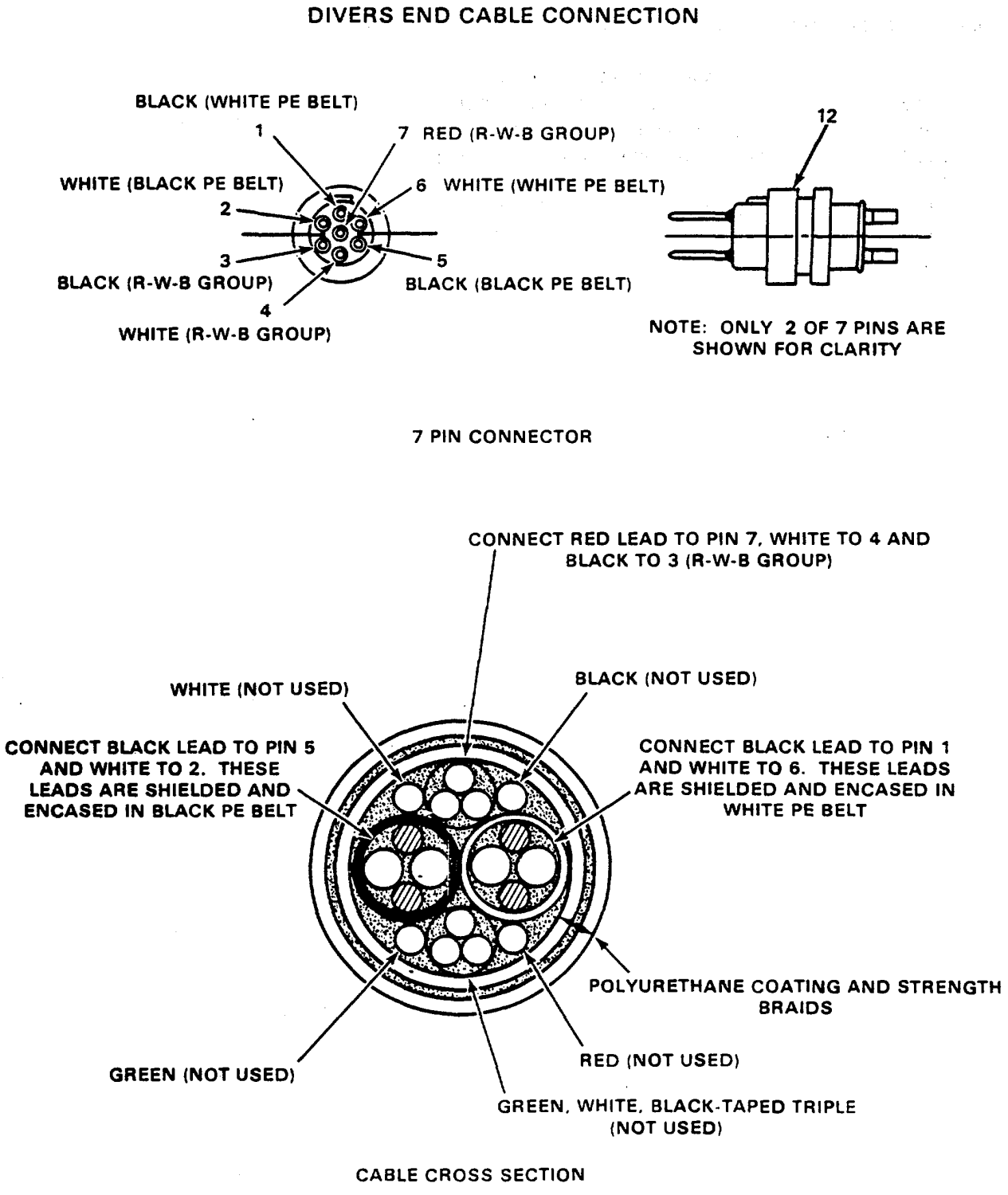


Figure 6-3. Communications Cable, Fabrication (Sheet 4 of 6).

6-5. Umbilical (Cont).

(ad) After connector cools, install new preformed packing (12) in groove of connector (13).

(ae) Apply halocarbon grease to connector pins.

(af) Slide boot (11) over soldered pins and seat boot (11) on bottom of connector (13).

(ag) Apply a light film of lubricant to outside of pin connector.

(ah) Slide connector nut (14) onto shell (15).

(ai) Install new preformed packing (16) in groove in shell (15).

(aj) Place two tube spaces (10) around cable, ensure bottoms fitting intoouter rim of support tube (7) and tops fitting under edge of pin connector boot (11).

(ak) Aline key of connector (13) with keyway in shell (15).

(al) While holding tube spaces (10) around wiring, slide shell (15) over connector boot (11) until pin (16) seats in hole in support tube (7).

(am) Ensure shell (15) and boot (11) are installed completely so that they do not turn.

(an) Install two retainer halves (17) on shell (15) and slide connector nut (14) down to secure then in place.

(ao) Tighten connector nut (14) and secure by tightening setscrew (18).

(ap) Remove cable (1) and cable chuck from vise.

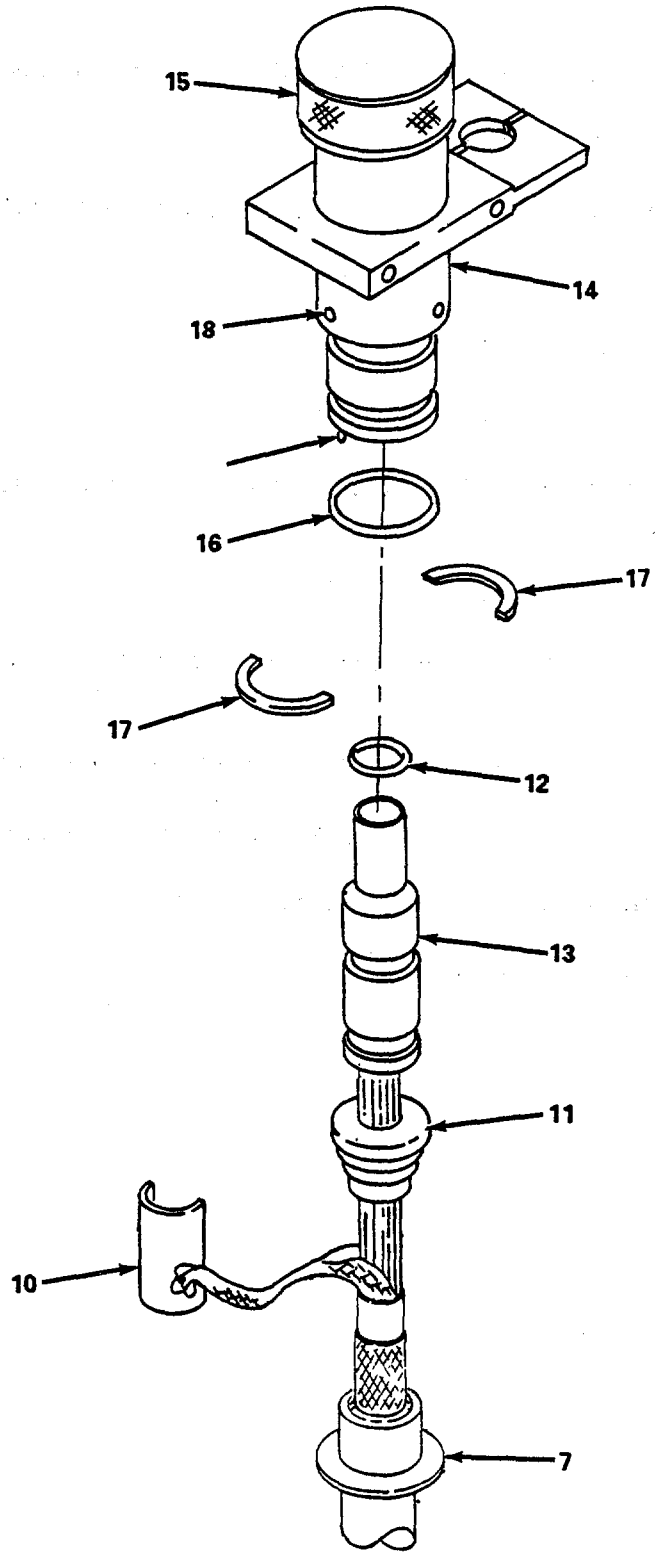


Figure 6-3. Communications Cable, Fabrication (Sheet 5 of 6).

6-5. Umbilical (Cont).

(aq) Perform steps (a) through (ab) for top side end of communications cable.

(ar) Locate two white wires and strip off approximately 3/8 in. (9.52 mm) of insulation from each.

(as) Solder two white wires together.

(at) Locate two black wires and strip off approximately 3/8 in. (9.52 mm) of insulation from each.

(au) Solder two black wires together.

(av) All unused wires should be trimmed back to mechanical termination nut (19).

(aw) Install preformed packing (20), slide nut (21), shell (22), nut (23), and leather ring (24) over leads (25).

(ax) Install preformed packing (20) in groove in shell (22).

(ay) Install shell (22) and ensure pin (26) alines with hole in support tube (27).

(az) Install two retainer halves (28) on shell (22) and slide connector nut (21) down to secure them in place.

(ba) Tighten connector nut (21) and secure by tightening setscrew (29).

(bb) Connect the white leads to the longer terminal on telephone plug (30) and connect the black leads to the shorter terminal on telephone plug (30).

(bc) Perform continuity test between white leads and pins 2 and 6 of divers end, and between the black leads and pins 1 and 5 of divers end.

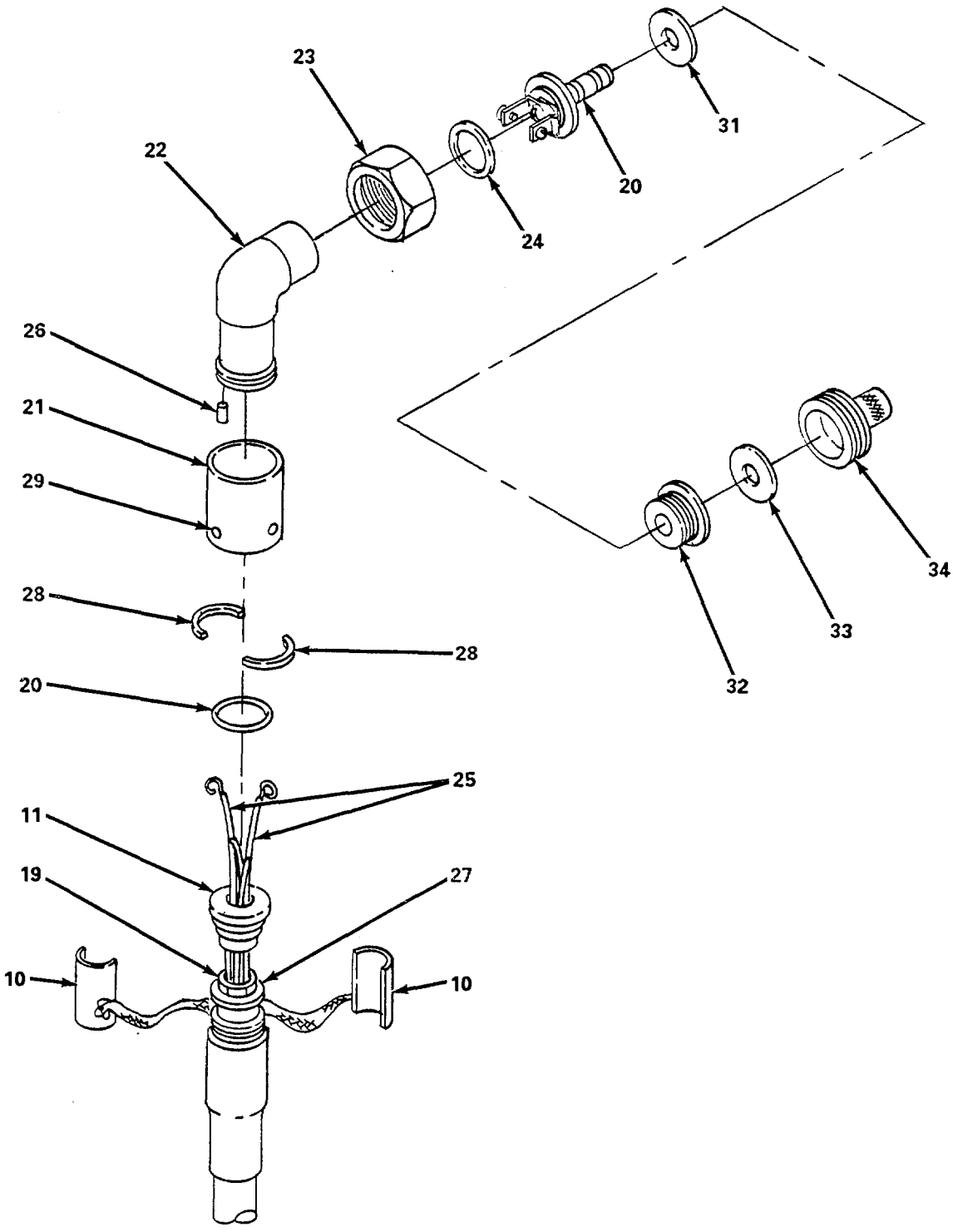


Figure 6-3. Communications Cable, Fabrication (Sheet 6 of 6).

6-5. Umbilical (Cont).

(4) *Communications/strength cable splice*. (figure 6-4)

(a) Remove all wax and dirt from the cable jacket (1) for a minimum of four inches from each side of the sheath opening.

(b) Cut the sheath (1) open, taking care not to cut the insulation.

NOTE

The width of the opening will depend on the size of the connectors being used.

(c) Cut the opening in the insulation (2).

(d) Bevel the insulation for 1/4-inch at both ends of opening.

(e) Connect thermoplastic insulated cables.

CAUTION

Do not use acid-core solder, or acid flux. Be sure to remove all anti-oxidant paste from connector area of aluminum crimp connectors.

(f) Use anti-oxidant paste with aluminum connectors.

NOTE

Protect cable insulation with wraps of cotton tape, when soldering.

(g) Solder connectors.

(h) Stagger individual connectors 1/2-inch.

(i) Insulate connectors with high voltage tape (3).

(j) Apply one layer, half lapped tape over the connector area.

(k) Trim mold body (4) and (5) half ends so that the mold will fit the cable slightly loose.

(l) Hold mod halves in place, centered over splice and snap together firmly.

(m) Tape ends of the mold to make a seal.

(n) Install pouring spouts (6) into the mold body.

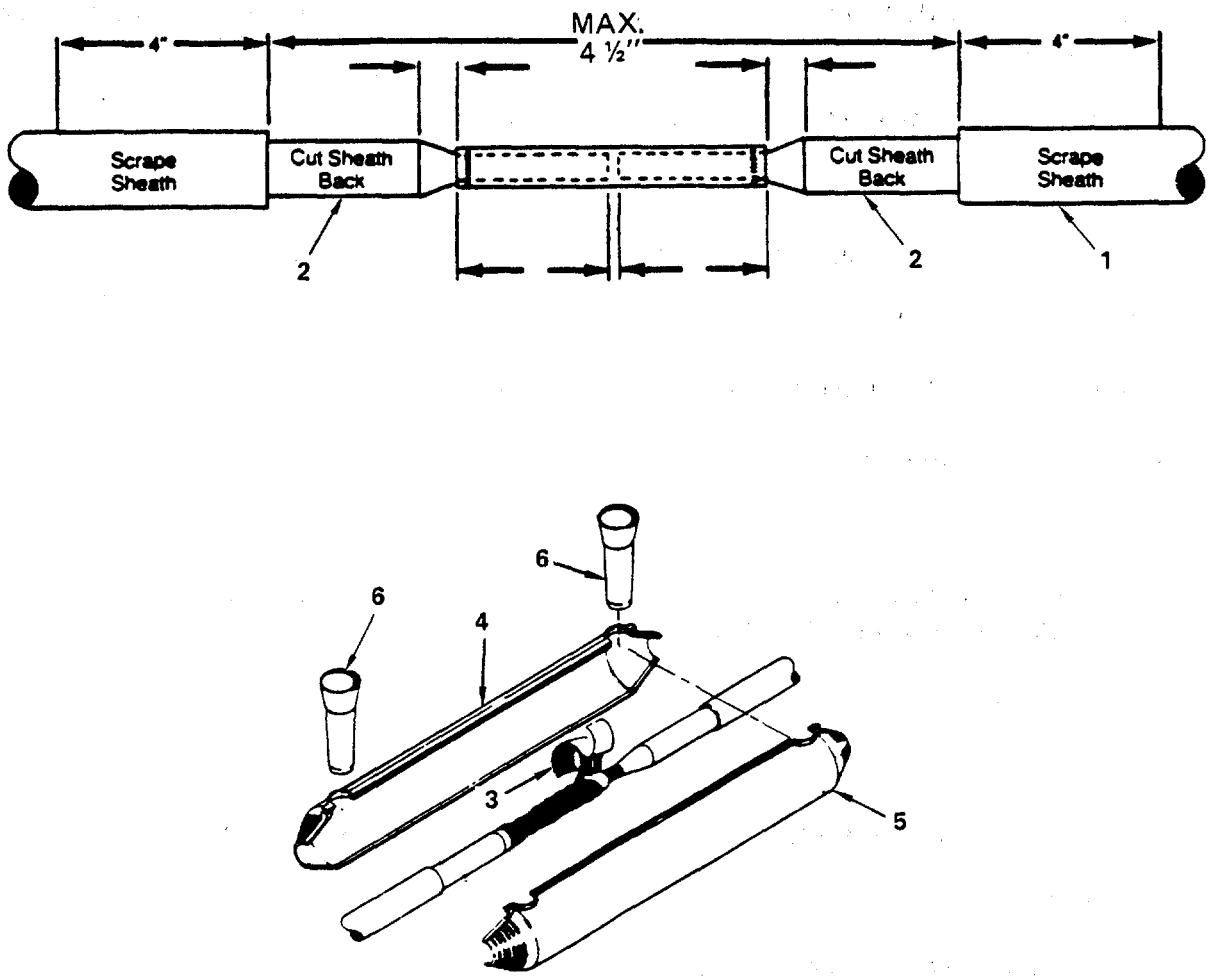


Figure 6-4. Communications/Strength Cable, Splice.

CAUTION

Pour resin immediately after mixing.

(o) Ensure that cable and mold are level.

(p) Mix resin thoroughly following the instructions in the cable splice kit.

6-5. Umbilical (Cont).

(q) Fill mold through one spout until both spouts are completely filled.

(r) Remove the spouts.

(s) When the resin has cooled and solidified, remove mold.

(5) *Replace.*

NOTE

- Repair of Umbilical can be accomplished by replacing either of the hoses or cable.
- The replace procedure for the hoses and cable are the same.

(a) Disassemble.

1 Lay out umbilical on clean surface where there is sufficient working room

CAUTION

When cutting wrap, be careful not to damage hoses or communication cable.

NOTE

Use same procedure to disassemble an umbilical assembled with a-tape wrap.

2 Cut marline wrap at one end of umbilical and separate hoses and communications cable. Continue separating hoses and cable for the length of the umbilical.

(b) Assemble marline wrap. (figure 6-5)

NOTE

Grip on the cable should be made approximately one foot back from the connector.

1 Attach surface end of communications cable (strength member) (1) to a stanchion.

2 Attach a tensioning device to a second fixed stanchion.

3 Attach diver end of communications cable (1) to tensioning device and apply tension until cable is rigid.

CAUTION

Do not pull on communications cable shackle. Use just enough tension to support the cable. Do not over stress.

4 Lay out air hose (2) and pneumofathometer hose (3).

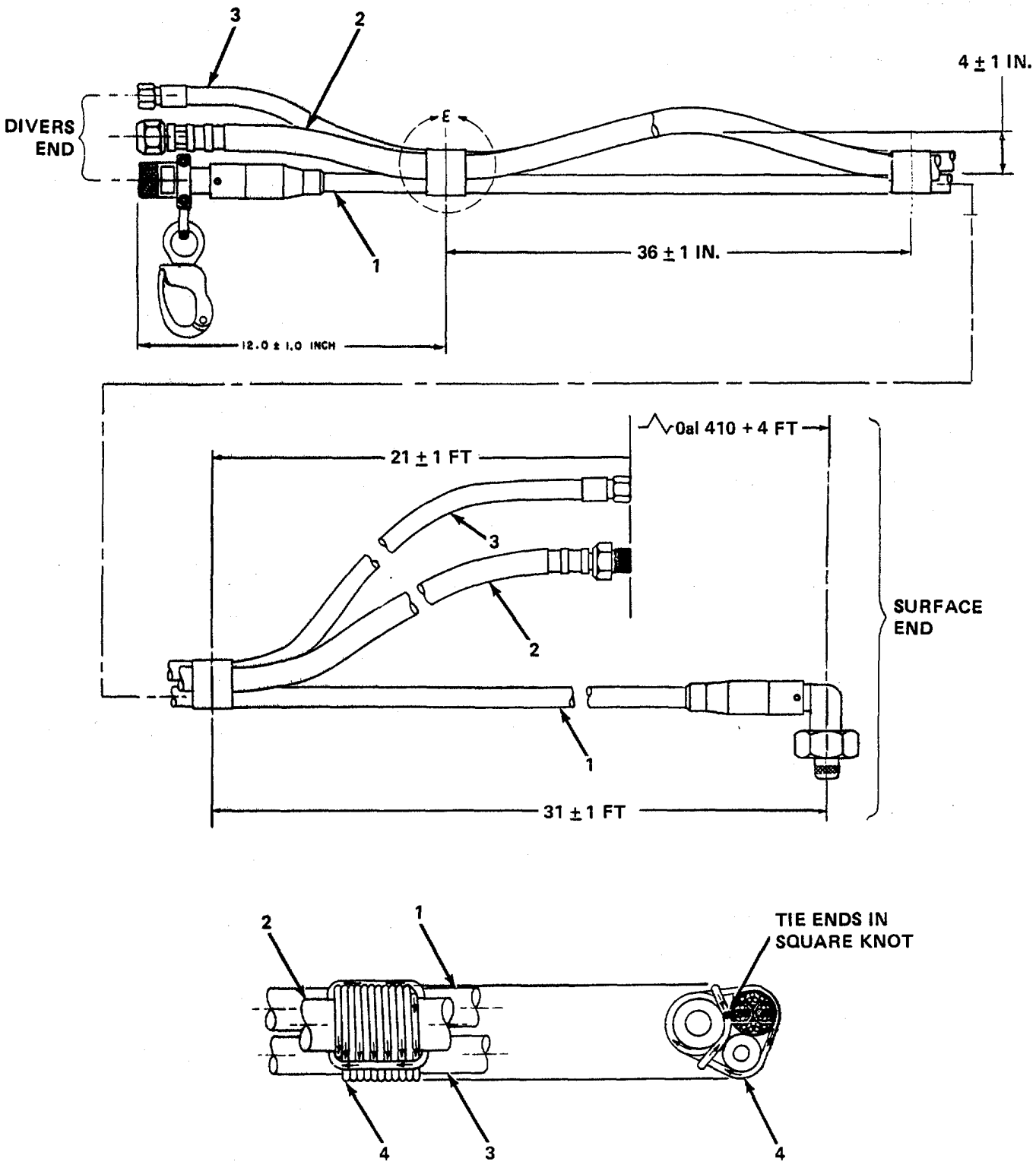


Figure 6-5. Marline Wrap of Umbilical.

5 Cap off the end of the air hose (2) and the pneumofathometer hose (3) at the diver end of the umbilical.

NOTE

Apply 150 lbs of air pressure to each hose during assembly procedure.

6 Cut off a 7 to 8 ft length of marline (4).

7 Find the center of the length of marline (4) and tie a clove hitch around the communications cable (1) 12 ft from diver end. Tighten hitch.

8 Line up air hose (2) and pneumofathometer hose (3) even with the end of the communication cable (1).

9 Gather both hoses at first hitch and wrap one end of the marline (4) four turns around both hoses and the cable.

10 Pass remaining marline between the cable and the two loose hoses.

11 Wrap other end of marline four turns around both hoses and cable.

NOTE

Make sure that both ends of the marline come out towards the same side on the cable.

12 Pass remaining marline between the cable and the two loose hoses.

13 Pull one end of marline between both hoses and cable and wrap once around cable and both hoses.

14 Pull other end of marline between both hoses and cable and wrap twice around cable and both hoses.

NOTE

Square knot should be under the cable (1).

15 Pull one end of marline between both hoses and cable and hold so that both ends are at same ends of cable. Pull tight and make a square knot.

16 Cut off ends of marline close to the cable.

17 Gather both hoses to the communications cable 36 inches from first wrap.

18 Allow about four inches of slack between hoses and cable (about a hand width) and wrap at this point using the same procedure as for the first wrap.

19 Continue making wraps every 36 inches for the length of the umbilical.

6-5. Umbilical (Cont).

NOTE

Last wrap should be 30 feet from surface end of umbilical.

20 Release air pressure from both hoses and remove end caps.

21 Release tension on cable.

(c) Assemble (tape wrap). (figure 6-6)

1 Attach surface end of communications cable (strength member) (1) to a stanchion.

2 Attach a tensioning device to a second fixed stanchion.

3 Attach diver end of communications cable (1) to tensioning device and apply tension until cable is rigid.

CAUTION

Do not pull on communications cable shackle. Use just enough tension to support the cable. Do not over stress.

4 Lay out air hose (2) and pneumofathometer hose (3).

5 Cap off the end of the air hose (2) and the pneumofathometer hose (3) at the diver end of the umbilical.

6 Line up air hose (2) and pneumofathometer hose (3) even with the end of the communication cable (1).

7 Cut a two foot length of 2 foot wide wrap tape.

8 Wrap end of tape (4) around cable (1) and join adhesive faces together to form an adhesive to adhesive cap length of 2 in.

9 Hold tape (1) taut and wrap about cable (1), air supply hose (2) and pneumofathometer hose (3). Continue with taping every 36 feet on cable.

10 Repeat steps Z through 9 at 18 in. intervals along the umbilical.

11 Release air pressure from both hoses and remove end caps.

12 Release tension on cable.

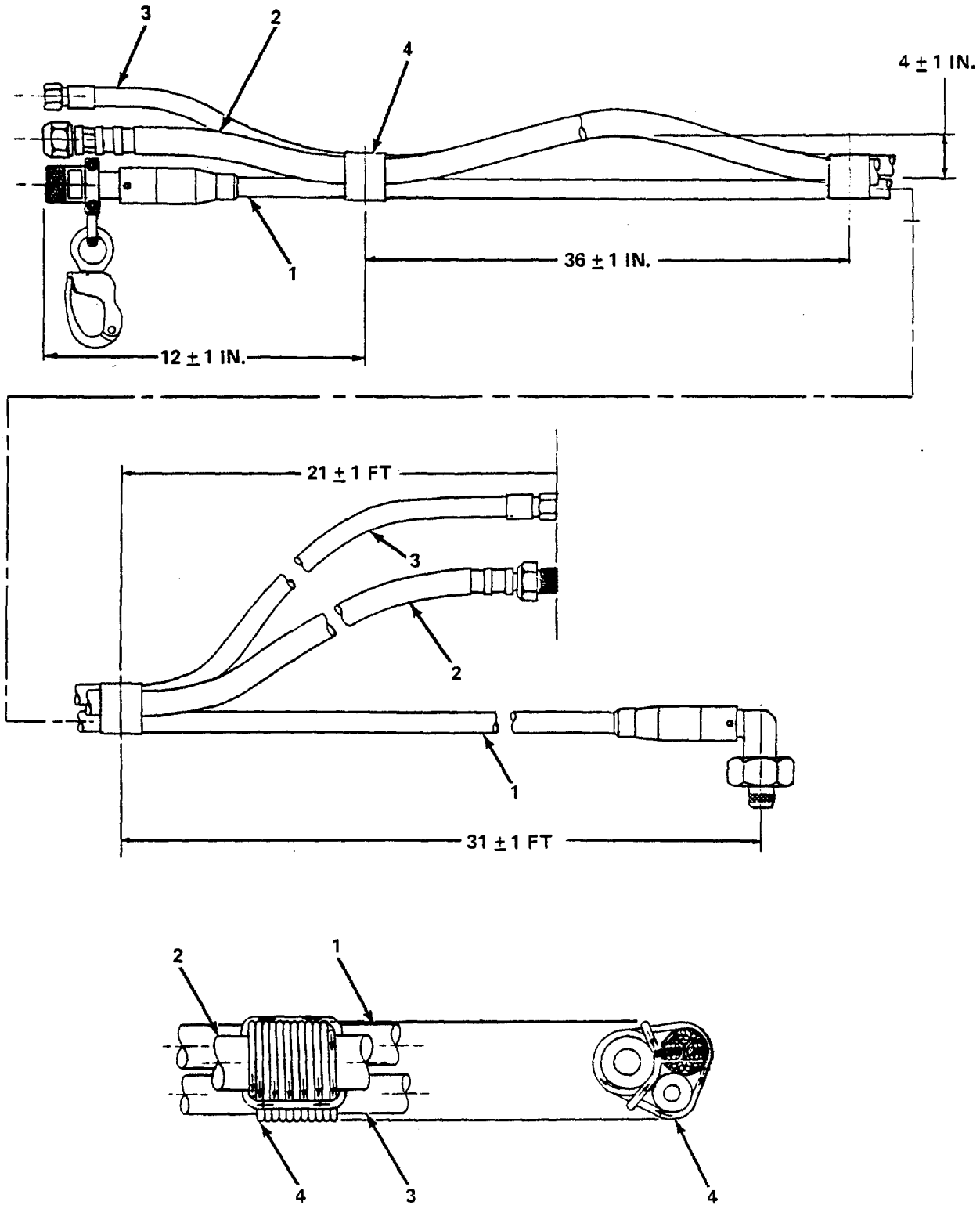


Figure 6-6. Tape Wrap of Umbilical.

APPENDIX A

REFERENCES

A-1. Scope. This appendix lists all forms, field manuals, technical manuals and miscellaneous publications referred to in this manual.

A-2. Forms.

Recommended Changes to Publications	DA Form 2028-2
Maintenance Inspection Report	DA Form 2404
Quality Deficiency Report (QDR)	SF 368

A-3. Technical Manuals.

The Army Maintenance Management System	TM 738-750
Destruction of Army Materiel to Prevent Enemy Use	TM 750-244-1-2
Repair Parts and Special Tools List	TM 5-4220-225-24P

A-4. Supply Bulletins.

Storage Serviceability Standard for TROSCOM Materiel	SB 742-97-01

A-5. Miscellaneous Publications.

The Army Maintenance Management System (TAMMS)	DA PAM 738-750
Military Diving Volume I	FM 20-11-1

APPENDIX B

MAINTENANCE ALLOCATION

INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for MK12 Surface Supported Diving System. It authorizes levels of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Maintenance Functions

Diving Air Compressor

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications . Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

B-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate "work time" figures will be shown for each level. The number of task-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

<u>UNIT</u>

C - Operator/Crew
O - Unit

<u>INTERMEDIATE</u>

F - Direct Support
H - General Support

<u>DEPOT</u>

D - Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (Sect. III and IV)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Level. The codes in this column indicate the maintenance level allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

B-5. Remarks (Sect. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

SECTION II. MAINTENANCE ALLOCATION CHART FOR MK12 SURFACE SUPPORTED DIVING SYSTEM

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
00	MK12 SURFACE SUPPORTED DIVING SYSTEM	Inspect		2.7					
		Test		1.5	2.3				
		Service		2.4					A
		Adjust			0.6				
		Replace			1.9			1 thru 56	B
		Repair		2.9	3.5	0.5		1 thru 56	C
01	DIVER'S DRESS	Inspect	0.2						
		Replace		0.1					B
		Repair		0.5				48, 49	C
0101	DIVER'S COVERALLS	Inspect	0.3						
		Service	0.3						
		Replace		0.1					B
		Repair		0.7				48	D
0102	DIVER'S DRYSUIT	Inspect	0.3						
		Replace		0.1				48, 49	B
		Repair		0.7					
0103	BOOTS	Inspect	0.1						
		Repair		0.7				48, 50	D
0104	DIVER'S MITTENS	Inspect	0.1						
		Repair		0.7				48, 49	
0105	DIVER'S HARNESS	Inspect	0.1						
		Repair		0.7				48	D
02	MK12 HELMET ASSEMBLY	Inspect	0.3						
		Test		0.5					
		Replace			2.0			22,14,41, 44,46	B
		Repair		0.5	2.5			22,14,41, 55,44,46	C

SECTION II. MAINTENANCE ALLOCATION CHART FOR MK12 SURFACE SUPPORTED DIVING SYSTEM

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
0201	HELMET								
	BREECH RING	Inspect	0.2						
		Service	0.2						
		Replace		0.5				15,20,14, 39,41,51, 44,46	
0202	VIEW PORTS	Inspect	0.2						
		Replace			0.7			14,15,22, 39,51	
0203	LOWER BREECH RING ASSEMBLY	Inspect	0.2						
		Replace		0.4				14,15,41, 51,19,55, 56	
		Repair		0.6				14,15,39, 41,51,19, 55,56	
0204	AIR SUPPLY ASSEMBLY	Inspect	0.1						
		Test	0.5						
		Adjust		0.4					
		Repair			3.0				C
020401	AIR SUPPLY ADAPTER	Replace		0.3				45,40,13, 8,14,15, 19,51	
		Repair			0.5				
020402	AIR SUPPLY TUBE	Inspect	0.2						
		Replace		0.3				40,22,13, 14,15	
020403	AIR SUPPLY VALVE	Replace		0.3					
		Repair			0.5			8,15,19, 26,27	
020404	DIFFUSER ASSEMBLY	Inspect	0.2						
		Replace		0.3				26	
		Repair			0.5			26	

SECTION II. MAINTENANCE ALLOCATION CHART FOR MK12 SURFACE SUPPORTED DIVING SYSTEM

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
0205	ADJUSTABLE EXHAUST VALVE ASSEMBLY	Inspect	0.1						
		Adjust			0.4				
		Replace		0.3				40,15,22, 13,8,14, 41,23,17, 54	
		Repair	0.4					40,15,22, 13,8,14, 41,23,17, 54	
0206	AMBIENT EXHAUST VALVE	Inspect	0.1						
		Replace		0.3				40,22,13, 8,14,15, 41	
		Repair		0.6				40,22,13 8,14,15, 41	
0207	HELMET LUG	Inspect	0.1						
		Replace		0.3				41,20,14, 15,28	
		Repair		0.3				41,20,14, 15,28	
0208	HELMET COMMUNICA-TIONS	Inspect	0.2						
		Test		0.3					
		Replace		0.5				15,16,22, 14,29,52, 51	
		Repair		0.2				15,16,22, 14,29,52, 51	
020801	COMMUNICA-TIONS WHIP	Inspect	0.2						
		Test		0.2				52	
		Replace			0.3			53,34,22 14,15,41, 51	
0209	HELMET LINER	Inspect	0.1						
		Replace		0.2					

SECTION II. MAINTENANCE ALLOCATION CHART FOR MK12 SURFACE SUPPORTED DIVING SYSTEM

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL UNIT C	UNIT O	INTERMEDIATE F	INTERMEDIATE H	DEPOT D	(5) TOOLS	(6) REMARKS
0210	HELMET DUCTS	Inspect	0.2						
		Replace		0.5					
0211	HELMET SHELL	Inspect	0.2						
		Replace			1.0			21,14,41, 51,4,17	B
0212	AIR SUPPLY WHIP	Inspect	0.1						
		Service		0.3					
		Test				0.2			
		Replace		0.1				12	
03	UMBILICAL	Inspect	1.0						
		Test				1.0			
		Service	1.0						
		Replace		0.5				47,12	
		Repair				2.5		32,33,35, 37,39,30, 12	
04	COMMUNICA-TIONS BOX	Inspect	0.2						
		Test	0.2						
		Service	0.2						
		Replace		0.1				18	
		Repair			1.5			47	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
MK12 SURFACE SUPPORTED DIVING SYSTEM

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	1/4-Inch Open End Wrench	5120-00-228-9997	
2	O	5/16-Inch Box and Open End Wrench	5120-00-228-9503	
3	O	11/32-Inch Open End Wrench	5120-00-278-0342	
4	O	3/8-Inch Box and Open End Wrench	5120-00-228-9504	
5	O	7/16-Inch Box and Open End Wrench	5120-00-228-9505	
6	H	9/16-Inch Box and Open End Wrench	5120-00-228-9507	
7	O	5/8-Inch Box and Open End Wrench	5120-00-228-9508	
8	O	13/16-Inch Box and Open End Wrench	5120-00-228-9511	
9	O	15/16-Inch Box and Open End Wrench	5120-00-228-9513	
10	O	7/8-Inch Box and Open End Wrench	5120-00-228-9512	
11	O	1 and 1-1/8-Inch Open End Wrench	5120-0-187-7133	
12	O	1-3/8-Inch Box and Open End Wrench	5120-00-228-9519	
13	O	1-1/4-Inch Box and Open End Wrench	5120-00-228-9517	
14	O	0-50 In.-Lb. 3/8-Inch Drive Torque Wrench	5120-00-028-4229	
15	O	Socket Wrench Handle	5120-00-198-5400	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
MK12 SURFACE SUPPORTED DIVING SYSTEM

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
16		.035 Socket Type Hex Wrench	5120-00-198-5400	
17	O	5/64-Inch Socket Type Hex Wrench	5120-00-214-2504	
18	O	1-7/8-Inch Open End Wrench	5120-00-288-8713	
19	O	3/32-Inch Socket Type Hex Wrench	5120-00-242-7410	
20	O	7/64-Inch Socket Type Hex Wrench	5120-00-889-2162	
21	O	1/8-Inch Socket Type Hex Wrench	5120-00-240-5292	
22	O	9/64-Inch Socket Type Hex Wrench	5120-00-889-2163	
23	O	5/32-inch Socket Type Hex Wrench	5120-00-198-5392	
24	O	3/16-Inch Socket Type Hex Wrench	5120-00-240-5300	
25	O	1/4-Inch Socket Type Hex Wrench	5120-00-224-4659	
26	O	Pliers, Soft, Curved, Medium Size	5120-00-624-8065	
27	O	Pliers, Outside, Snap Ring	5120-00-288-9716	
28	O	3/32-Inch Punch	5120-00-293-3435	
29	O	Screwdrivers, Jewelers	5120-00-180-0705 5120-00-288-8739	
30	H	Screwdriver, Flat Tip, 6-Inch	5120-00-596-8653	
31	O	Hammer, Ball Peen	5120-00-061-8541	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
MK12 SURFACE SUPPORTED DIVING SYSTEM

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
32	F	Banding Tool		
33	F	Banding Tool Adapter		
34	F	Wire Stripper and Cutter	5120-00-487-2936	
35	O	Pliers, Long Nose 8-Inch	5120-00-293-0032	
36	O	Crow Foot Adapter 3/8 Drive	5120-01-092-3276	
37	O	Wrench Spanner	5120-00-288-6468	
38	F	Knife, Craftsman	5110-00-293-1143	
39		Mallet, Rubber	5120-00-293-3399	
40	O	3/4-Inch Combination Wrench	5120-00-228-9510	
41	O	Adapter, Socket Wrench	5120-01-257-8404	
42	O	1/2-Inch Box and Open End Wrench	5180-00-228-9506	
43	O	11/16-Inch Box and Open End Wrench	5120-00-128-9509	
44	C	MK12 Test Set	6625-01-203-4978	
45	O	Pliers Inside Snap Ring	5120-00-752-9755	
46	C	Blanking Plate, Helmet	4220-01-202-1325	
47	F	Tool Kit General Mechanic's	5180-00-177-7033	
48	O	Shears	5110-00-223-6370	
49	O	Roller		
50	H	Hacksaw	5110-00-289-9657	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
MK12 SURFACE SUPPORTED DIVING SYSTEM

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
51	O	Hex Insert		SZ-8A
52	O	Multimeter	6625-00-999-6282	
53	F	Gun, Soldering		
54	O	Hex Insert		SZ-11A
55	O	Hex Insert		SZ-9A
56	O	Hex Insert		SZ-7A
57	F	Tool Kit, Electronic		
58	H	Vise		
59	0	Iron		

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Service is cleaning.
B	Replace is removing system from operation and installation of replacement system.
C	Repair/Replace is replacement of sub components.
D	Repair of equipment is done locally or commercially as per individual maintenance paragraph. If commercial or local facilities are not available, no repair is authorized.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

C-1. Scope. This appendix lists components of end item and basic issue items for the MK12 Surface Supported Diving System (SSDS) to help you inventory items required for safe and efficient operation.

C-2. General. The Components of End Item and Basic Issue Items Lists are divided into the following sections.

a. *Section II. Components of End Item*. This listing is for informational purposes only, and is not authority to requisition replacements. The items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. *Section III. Basic Issue Items*. These are the minimum essential items required to place the MK12 (SSDS) in operation. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. Explanation of Columns. The following provides an explanation of columns found in the tabular listings:

a. *Column (1). Illustration Number (Illus Number)*. This column indicates the number of the illustration in which the item is shown.

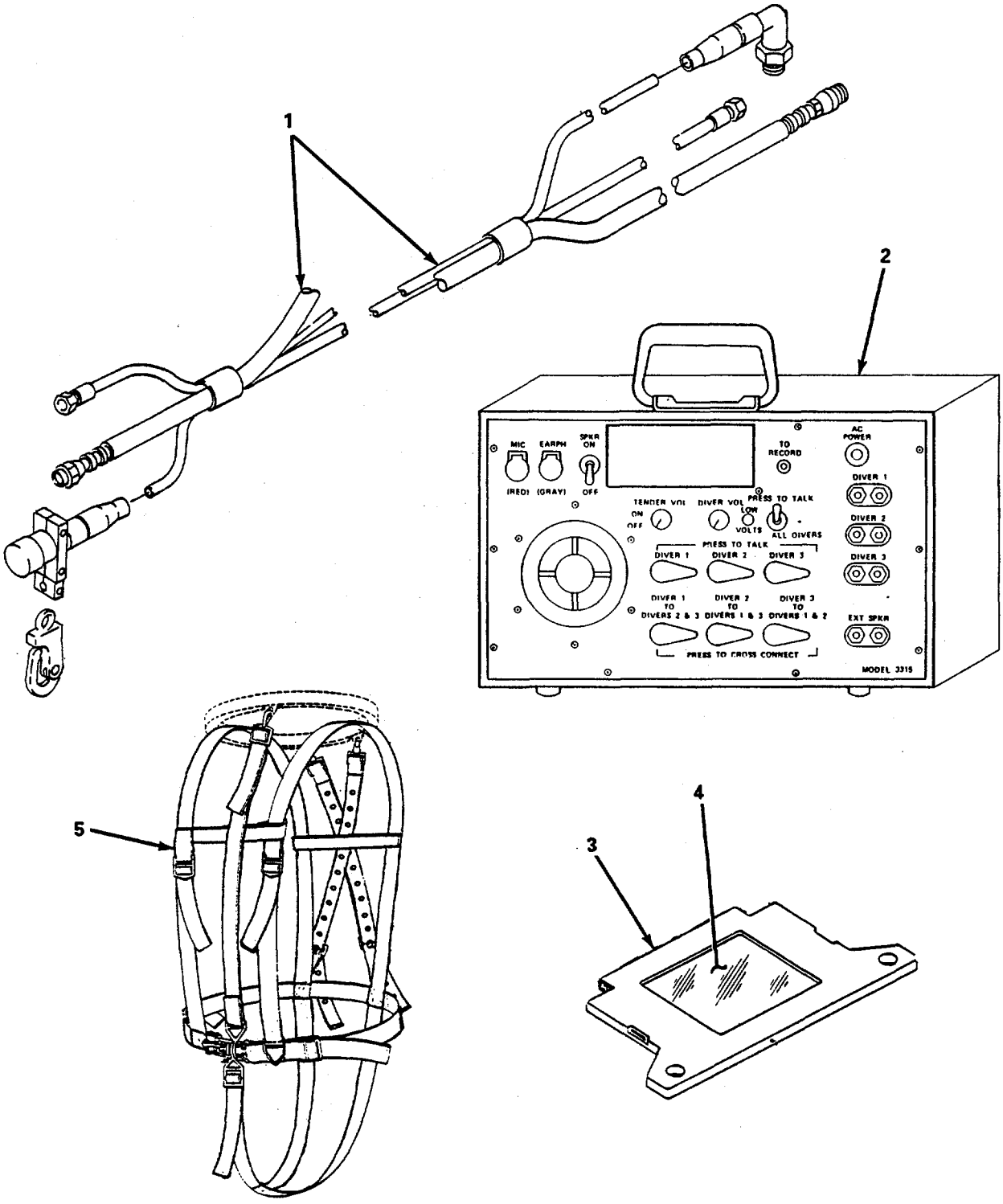
b. *Column (2). National Stock Number*. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

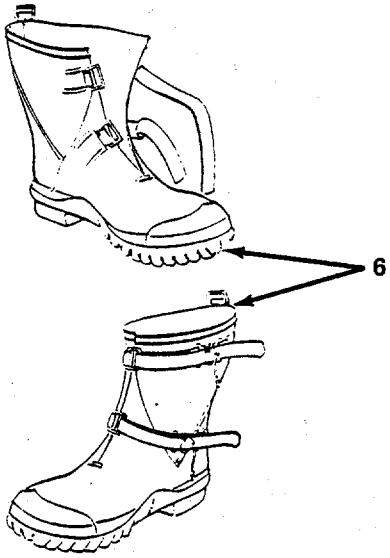
c. *Column (3). Description*. Indicates the Federal item name, and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. *Column (4). Unit of Measure (U/M)*. Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

e. *Column (5). Quantity Required (Qty Rqr)*. Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEMS

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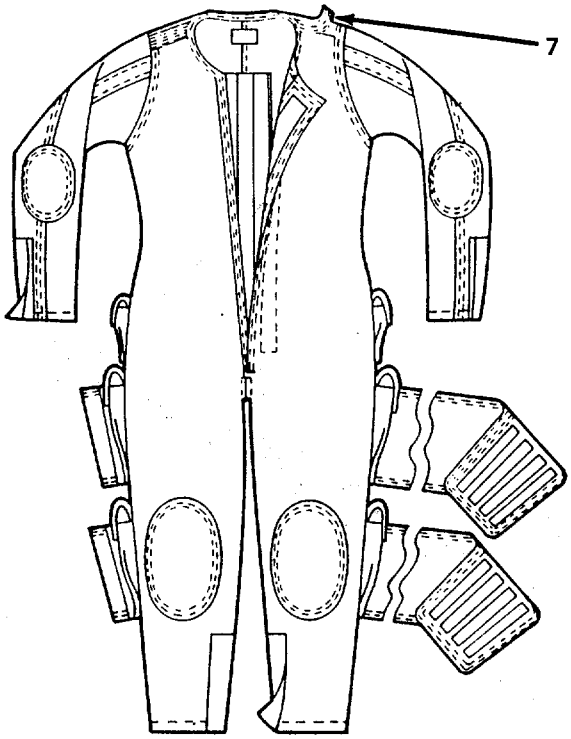
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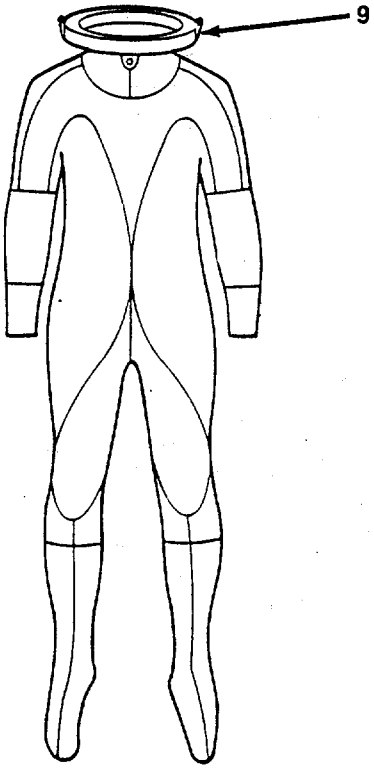
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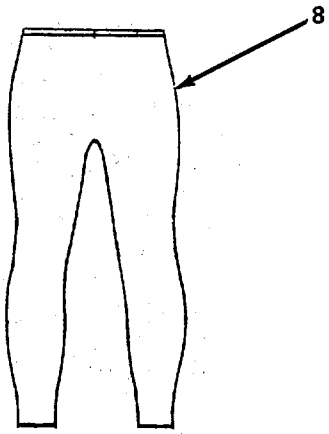
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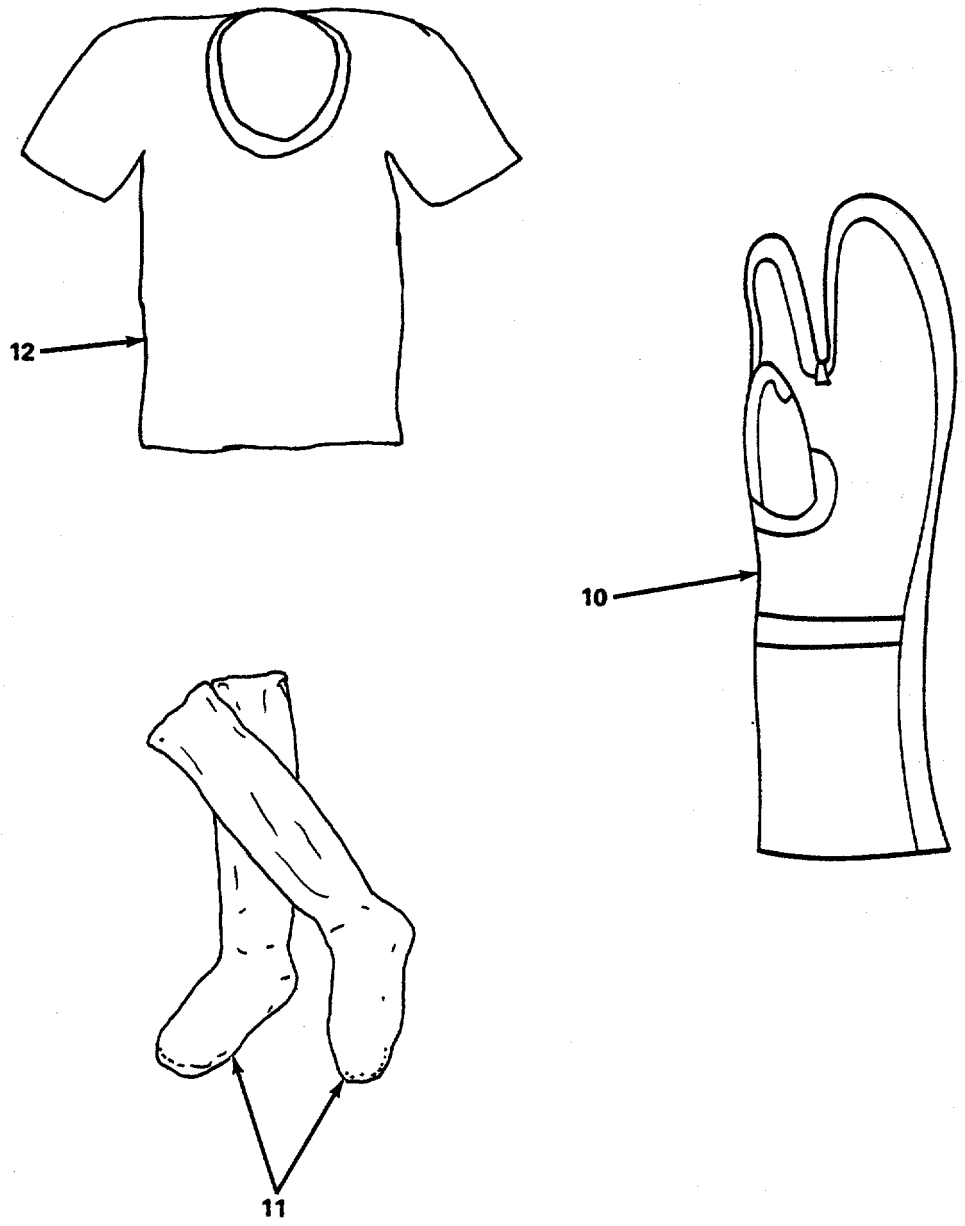
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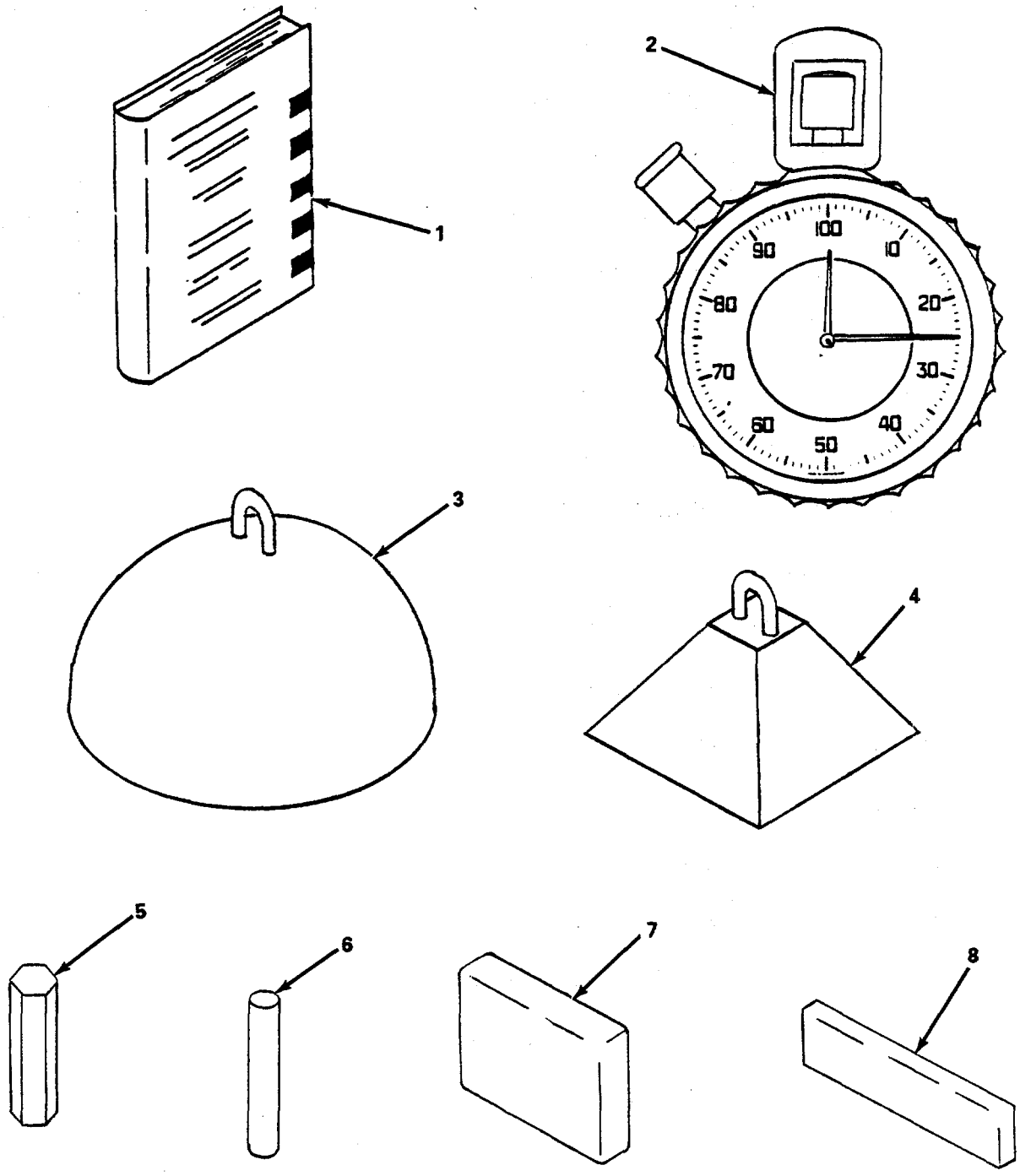
10
11

(1) Illus Number	(2) National stock number	(3) Description FSCM and Part Number Usable On Code	(4) U/M	(5) Qty Rqr
1		300 ft Umbilical Assembly, 1/2 in.	ea	1
	4220-01-147-2257	600 ft Umbilical Assembly, 1/2 in.	ea	1
2	5830-01-117-5432	Communications Box	ea	1
3	4220-01-140-0453	Shield, Welding Assembly	ea	1
4	4220-01-138-8275	Lens, Shield Welding No. 6	ea	1
	4220-01-243-1566	Lens, Welding Shield	ea	1
	4220-01-243-1567	Lens, Welding Shield	ea	1
5	4220-01-128-9191	Harness, Divers	ea	1
6	0000-LL-CQA-0979	Boots, Divers		
	4220-01-165-0295	MIL-B-87031, Size 8	pr	1
	4220-01-244-0167	MIL-B-87031, Size 12	pr	1
	4220-01-244-4790	MIL-B-87031, Size 14	pr	3
7	0000-LL-CQA-0980	Coveralls, Divers, MK12		
	4220-01-163-8706	N!IL-C-87032, Size 1	ea	1
	4220-01-136-3386	MIL-C-87032, Size 2	ea	2
	4220-01-231-6826	MIL-C-87032, Size 3	ea	3
	4220-01-153-8452	MIL-C-87032, Size 4	ea	1
8	0000-LL-CQA-0984	Drawers, Extra Exposure		
	8415-00-782-3226	MIL-D-15390, Size Small	pr	6
	8415-00-782-3227	MIL-D-15390, Size Med	pr	6
	8415-00-782-3228	MIL-D-15390, Size Large	pr	6
	8415-00-782-3229	MIL-D-15390, Size Ex Large	pr	6

(1) Illus Number	(2) National stock number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
9	000-LL-CQA-0981	Dress, Divers, MK12			
	4220-01-203-4868	MIL-D-87030, Size 1		ea	2
	4220-01-170-9862	MIL-D-87030, Size 2		ea	2
	4220-01-220-1332	MIL-D-87030, Size 3		ea	2
	4220-01-209-0972	MIL-D-87030, Size 4		ea	2
	4220-01-172-5819			ea	1
10	0000-LL-CQA-0982	Mittens, Divers			
	4220-01-140-2158	MIL-M-87029, Size 1		pr	1
	4220-01-163-8707	MIL-M-87029, Size 2		pr	2
	4220-01-131-5726	MIL-M-87029, Size 3		pr	3
11	0000-LL-CQA-0985	Socks, Mens Winter			
	8440-00-153-6718	MIL-S-4059211		pr	4
	8440-00-153-6720	MIL-S-4059212		pr	4
	0099-LL-406-4017	MIL-S-4055215		pr	4
12	0000-LL-CQA-6986	Undershirt, Ext. Exp.			
	8415-00-270-2012	MIL-U-1761192, Size 38		ea	6
	8415-00-270-2013	MIL-U-1761152, Size 42		ea	6
	8415-00-270-2014	MIL-U-1761152, Size 44		ea	6
	8415-00-270-2015	MIL-U-1761157, Size 46		ea	6

SECTION III. BASIC ISSUE ITEMS



(1) Illus Number	(2) National stock number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
1		TM 5-4220-225-14/24P		ea	1
2	6645-00-126-0286	Watch, Stop		ea	4
3	4220-00-377-0412	Weight, 100 lb		ea	1
4	4220-00-371-9498	Weight, 50 lb		ea	1
5	6605-00-255-8316	Weight, Sounding		ea	1
6	4220-01-130-6733	Weight, Calf		ea	8
7	4220-01-126-9207	Weight, Hip		ea	4
8	4220-01-128-2306	Weight, Thigh		ea	6

APPENDIX D
ADDITIONAL AUTHORIZATION LIST
SECTION I. INTRODUCTION

D-1. Scope. This appendix lists additional items you are authorized for the support of the MK12 Surface Supported Diving System (SSDS).

D-2. General. This list identifies items that do not have to accompany the MK12 SSDS and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. Explanation of Listing. National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name.

SECTION II. ADDITIONAL AUTHORIZATION LIST

National Stock Number	Description	Usable On Code	U/M	Qty Rqr
6220-00-268-9802	Bag, CVS Diver		ea	2
9160-00-253-1171	Bees Wax Technical		lb	2
5110-00-372-0656	Blade, Diver KN		ea	1
5140-00-587-5558	Box, Tool x Spare Parts		ea	1
4730-00-289-5912	Clamp, Hose		ea	12
4730-00-224-7325	Coupling, Hose		ea	2
4730-00-369-4589	Coupling, Hose		ea	2
4730-00-395-4314	Coupling Assembly, Hose		ea	2
4020-00-240-2164	Cord, CTN 3/4 in. CRCM		cl	1
4220-00-390-5439	Descending Line, Divers		cl	3
5136-00-189-3251	Die, Rethreading 1 1/16 17		ea	1
5136-00-189-3250	Die, Rethreading 1/2 12		ea	1
Helle 3315-S	Diver Communication Station		ea	1

SECTION II. ADDITIONAL AUTHORIZATION LIST (Cont)

National Stock Number	Description	Usable On Code	U/M	Qty Rqr
Helle 11078	Diver Communication Station Spare Parts		ea	1
8415-00-782-3226	Drawers, A-1 Small		ea	6
8415-00-782-3227	Drawers, A-1 Medium		ea	6
8415-00-782-3228	Drawers, A-1, Large		ea	6
8415-00-782-3229	Drawers, A-1, X-Large		ea	6
4220-00-355-4834	Fiber Rope Assembly, Single Leg		cl	3
8345-00-935-0534	Flag, Alpha Code B Size 6		ea	1
4220-00-372-0665	Knife, Diver Removal BL		ea	3
2090-00-369-4536	Ladder, Divers		ea1	
6230-00-892-2488	Light, Exterior Diver Equipment		ea	1
4220-00-142-1073	Manifold, Air Diver		ea	1
4730-00-289-1258	Nipple, Hose		ea	2
4730-00-212-6268	Reducer, Air Hose Diver		ea	4
4730-00-372-0593	Reducer, Air Hose Diver		ea	4
8440-00-193-6717	Socks, Mens Winter Size 10		ea	4
8440-00-153-6718	Socks, Mens Winter Size 11		ea	4
8440-00-153-6719	Socks, Mens Winter Size 12		ea	4
8440-00-155-6721	Socks, Mens Winter Size 13		ea	4
8440-00-155-6721	Socks, Mens Winter Size 14		ea	4
4220-00-242-3078	Stage, Decompression Diver		ea	1
8415-00-270-2012	Undershirt Extreme Cold Weather, Small		ea	6
8415-00-270-2013	Undershirt Extreme Cold Weather, Medium		ea	6

SECTION II. ADDITIONAL AUTHORIZATION LIST (Cont)

National Stock Number	Description	Usable On Code	U/M	Qty Rqr
8415-00-270-2015	Undershirt Extreme Cold Weather, X-Large		ea	6
6645-00-126-0286	Watch, Stop		ea	1
4220-00-377-0412	Weight, Cl GALV 100 lb		ea	2
4220-00-371-9498	Weight, Cl GALV 50 lb		ea	1
6605-00-255-8316	Weight, SONDG 7 lbs		ea	1

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

E-1. Scope. This appendix lists expendable supplies and materials you need to operate and maintain the MK12 Surface Supported Diving System (SSDS). These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. Explanation of Columns.

a. Column (1) Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. E").

b. Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance

c. Column (3) National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National stock number	(4) Description	(5) U/M
1	O	8040-00-225-4548	RTV Sealant	oz
2		6810-00-983-8551	Alcohol, Isopropyl	qt
		6810-00-286-5435	Alcohol, Isopropyl	gl
3	O		Bag, Plastic	
4	O		Bands, Rubber	
5		9020-00-224-8021	Brush, Soft Bristle	ea
6		7930-00-985-6911	Cleaning Solution, Nonionic Detergent (NID), MIL-D-16791, Type I	gl
7		6505-00-754-0374	Cleaning Solution, Providone-lodine	gl
8		7920-00-044-9281	Cloth, Clean, Lint-Free	bl
9		7930-00-282-9699	Glue	oz
10	O	9150-00-754-2760	Halocarbon Grease 25-55	qt
11	O	8010-00-943-7128	Lacquer Thinner	gl
12	O	6850-00-963-5402	Lubricant Compound, Silicone Grease, MIL-A-46106, 8 oz	oz
13	O	5350-01-097-0745	Paper, Abrasive	sht
14		7930-00-266-7136	Polish, Metal, MIL-P-15422	pt
15			Razor blade	ea
16	O	8030-01-126-9460	Sealing Compound, Thread-Locking, MIL-S-46163, Type II, Grade M (LOCTITE 222)	oz
17	O	6505-00-275-0871	Clamp, Band-It	pt
18	O	3439-00-269-9610	Solder	lb
19	O		Talcum Powder	oz

(1) Item Number	(2) Level	(3) National stock number	(4) Description	(5) U/M
20		4220-01-039-1876	Tape, Marrying	rl
21		4220-01-172-7579	Tape, Polyken No. 827	re
22	O		Tape, Pressure Sensitive	
23	O	8030-00-889-3534	Tape, Teflon, MIL-T-27730, Size I	rl
24	C		Vinegar	qt
25	O		Water, Distilled	
26	O	3160-00-754-2760	Wax, Bees, Technical	pt
27	O		Wet Suit Cement, 4 Oz PN 9801-00	oz
28			Wrap, Nylon Tie	
29	O		Tailor's Soap	
30	O		Tape, Hook and Pile	

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INDEX (Cont)

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By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
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THE METRIC SYSTEM AND EQUIVALENTS

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3.2808.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu in.
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Square measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. in.
1 sq. decimeter = 100 sq. centimeters = 15.5 inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 feet
1 sq. dekameter (are) = 100 sq. meters = 1.076.4 sq. ft.
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 hectometers = .386 sq. miles

Liquid Measure

1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons
1 liter = 10 deciliters = 33.81 fl. ounces
1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3 38 fl. ounces
1 metric ton = 10 quintals = 1.1 short tons

Approximate Conversion Factors

To change	To	Multiply by
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
sq. inches	sq. centimeters	6.451
sq. feet	sq. meters	.093
sq. yards	sq. meters	.836
sq. miles	sq. kilometers	2.590
acres	sq. hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29.573
pints	liters	.472
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound inches	newton-meters	.11296

To change	To	Multiply by
ounce inches	newton-meters	.0070062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
sq. centimeters	sq. inches	.155
sq. meters	sq. yards	10.764
sq. kilometers	sq. miles	1.196
sq. hectometers	acres	2.471
cubic meters	cubic feet	35.315
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102
pound-feet	newton-meters	1.356

Temperature (Exact)

°F Fahrenheit temperature — 5/9 (after subtracting 32) — Celsius Temperature °C

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